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CONTENTS.

Authors are alone responsible for their respective statements.

No. 1. *July.*

PAGE

Address to the Royal Geographical Society, 1908. By the Rt. Hon. Sir George Taubman Goldie, K.C.M.G., D.C.L., F.R.S., President 1
Exploration in Southern Nigeria. By Lieut. E. A. Steel, R.A. (with 6 Illustrations and Map) 6
Some Scientific Results of the Antarctic Expeditions, 1901-1904. By Prof. J. W. Gregory, F.R.S. 25
A Contribution to the Topography of North-Western Greece. By the Rev. Canon C. M. Church and Prof. J. L. Myres (with 1 Illustration and 6 Sketch-maps) 47
Captain Aylmer's Journey in the Country south of the Tana River, East Africa (with Map) 55
The Geographical Distribution of Rainfall in the British Isles. By Hugh Robert Mill, D.SC. 59
Wade's Method of determining Longitude. By E. J. Scott, B.A., F.R.G.S. (with Illustration) 65
Admiralty Surveys during the Year 1907 69
Reviews:—
EUROPE—English County Bibliographies 70
ASIA—Himalayan Exploration 71
AFRICA—The Eastern Desert of Egypt. French Central Africa. South Africa 72
AMERICA—South American Rainfall 76
AUSTRALASIA AND PACIFIC ISLANDS—The Western Pacific. Australia and New Zealand 77
POLAR REGIONS—Arctic Researches 80
GENERAL—Some Remote Islands 81
SHORT NOTICES 81
The Monthly Record 82
Obituary—Sir John Evans 92
Obituary of the Year 94
Correspondence—Journeys of the late W. H. Johnson. By Dr. T. G. Longstaff. The Westernmost Feeders of the Nile. By Captain D. Comyn 94
Meetings of the Royal Geographical Society, Session 1907-1908 95
Geographical Literature of the Month 101
New Maps 116

MAPS.

Map showing Greek occupation of the Macrinoros Defiles in 1829 52
General Sketch-map of North-Western Greece 54
Sketch-map of Boundary between Kamerun and French Congo 88
Map of Recent Explorations in Southern Nigeria 120
Sketch-map of the Country between Kitui and the Tana River 120

No. 2. *August.*

PAGE

The Douglas Glacier and its Neighbourhood. By James Mackintosh Bell, A.M., PH.D., Director of the Geological Survey of New Zealand (with 6 Illustrations and Map) 121
The Exploration of Prince Charles Foreland, 1906-1907. By William S. Bruce, LL.D., F.R.S.E. (with Map) 139
Recent Literature on the Plan of the Earth. By Prof. J. W. Gregory, F.R.S. 151
Note on a Survey from Green Bay, North-East Coast of Newfoundland, to Bonne Bay, on the West Coast. By H. C. Thomson (with 6 Illustrations and Sketch-map) 157
Reviews:—
EUROPE—Pomerania. Iceland 163
ASIA—A Journey across China 164
AFRICA—The Aswan Cataract. The Bushmen. Egyptian Boundary Survey. German East Africa. South-West Africa 165
AMERICA—Geological History of Tropical America. Birds of Tierra del Fuego 169
POLAR REGIONS—Amundsen's 'North-West Passage' 171
MATHEMATICAL AND PHYSICAL GEOGRAPHY—Geographical Evolution .. 173
GENERAL—The Stereoscope in Geography Teaching. A New Life of Columbus 174
SHORT NOTICES 175
The Southern Cyclonic Belt. By Colonel H. E. Rawson, C.B., R.E. 178
The Monthly Record 179
Obituary—Carl Christian Koldewey. Cesareo Fernandez Duro. By C. R. M. Johann Palacký. Eduard Glaser. Dr. Ferdinand Löwl. Major-Gen. Shaw Stewart 191
Correspondence—Southern Nigeria. By Donald MacAlister 195
Meetings of the Royal Geographical Society, Session 1907-1908 195
Geographical Literature of the Month 197
New Maps 212

MAPS.

Sketch-map showing the Proposed Railway between Green Bay and Bonne Bay 159
Sketch-map showing Portion of the Southern Alps of New Zealand 216
Preliminary Map of Prince Charles Foreland 216

No. 3. *September.*

Balkan Geography and Balkan Railways. By Noel Buxton (with 7 Illustrations and Map) 217
Journey on Upper Salwin, October—December, 1905. By George Forrest (with 8 Illustrations and Map) 239
Recent Exploration in British New Guinea (with Map)—
I. Journeys of Messrs. Barton, Strong, Monckton, and Others 266
II. Notes on the Central Part of the Southern Coast of Papua (British New Guinea) 270
A Canoe Trip to the Plains of the Caribou. By Ernest Thompson Seton (with Sketch-map) 275
Formation of Valleys in Porous Strata—
I. Solution-Subsidence Valleys and Swallow-holes within the Hythe Beds Area of West Malling and Maidstone. By F. J. Bennett (with 7 Illustrations and 4 Sketch-maps) 277
II. The Chiltern Valleys. By the Rev. E. C. Spicer, F.G.S. 288
Reviews:—
EUROPE—Istria. Russia 293
ASIA—Across Asia 295
AFRICA—West African Borderlands 296
AMERICA—The Vegetation of Chile 297

PAGE

MATHEMATICAL AND PHYSICAL GEOGRAPHY—Marine Meteorology. The Standard Text-book on Oceanography 300
SHORT NOTICES 302
The Monthly Record 303
Geographical Literature of the Month 313
New Maps 323

MAPS.

Sketch-map of Aylmer and Clinton-Colden Lakes 276
Sketch-maps illustrating Formation of Valleys in Porous Strata, I.–IV. 278–286
Sketch-map of the Balkan Peninsula 328
Sketch-map of the Upper Salwin 328
Map of Part of British New Guinea 328

No. 4. *October.*

On the Route of Bolivar's Great March: Caracas to Bogotá viâ Arauca and the Paramo of Pisva. By Prof. Hiram Bingham (with 6 Illustrations and Map) 329
Dr. Stein's Expedition in Central Asia 347
Vicinity of Lake Te Anan and Milford Sound, New Zealand. By Prof. P. Marshall, D.SC., F.G.S. (with 5 Illustrations and Sketch-map) 353
The Ninth International Geographical Congress. By Geo. G. Chisholm .. 364
Sixteenth International Congress of Americanists at Vienna, September, 1908. By Sir Clements R. Markham, K.C.B., F.R.S. 376
An Unconventional Map of the World, and a Plea for its Use in Schools. By R. D. Oldham (with Sketch-map) 377
The Distribution of Population in the United States. By Prof. Albert Perry Brigham 380
The Present and Future Work of the Geographer. By Major E. H. Hills, C.M.G., R.E. 390
Environment and Race. By Prof. William Ridgeway, M.A., F.B.A., LITT.D., LL.D. 405
Reviews:—
EUROPE—The British Coasts. The Alps 413
ASIA—High Asia. Two Guides to Ceylon 416
AFRICA—Cyrenaica 419
AMERICA—The History of the Niagara Falls 420
GENERAL—Ethnography 421
SHORT NOTICES 422
The Monthly Record 423
Correspondence—Burma 433
Geographical Literature of the Month 434
New Maps 444

MAPS.

Sketch-map of the Country between Milford Sound and Te Anan Lake .. 355
The World, showing Distance and Direction from Greenwich 378
Sketch-map showing the Route of Prof. Hiram Bingham from Caracas to Bogotá 448

No. 5. *November.*

Some Geographical Aspects of the Nile. By Captain H. G. Lyons, F.R.S., F.R.G.S., Director-General of the Survey Department of Egypt (with 5 Illustrations, Diagram, and Map) 449
The First Circuit round Africa, and the Supposed Record of it. By Prof. W. M. Flinders Petrie, D.C.L., LL.D., F.R.S., M.R.A. (with 2 Illustrations) 480
The Swedish Magellanian Expedition, 1907–1909: Preliminary Reports. By Carl Skottsberg, D.SC., Leader of the Expedition 485
The Uganda-Congo Boundary Commission. By Major R. G. T. Bright, C.M.G. 488
Levelling between the Nile and Congo Basins (with Map) 493
Further Explorations in the Hunza-Nagar and the Hispar Glaciers. By Mrs. Fanny Bullock Workman 495

PAGE

The Port of Manchester: The Influence of a Great Canal. By John M'Farlane, Lecturer in Geography at the University of Manchester (with Sketch-map) 496
Mr. Monckton's Journey across New Guinea 503
Geography at the British Association 508
The Southern Kalahari 513
Reviews:—
Asia—Asiatic Travels. Borneo. Ceram. Kozlof's Central Asian Expedition of 1899–1901 516
Africa—The Peninsula of Sinai. German South-West Africa. Eritrea 520
America—The Mystery of the Pilcomayo 523
Australasia—Early Enterprise in Queensland 525
General—Cosmogony 526
Map of Dr. Sven Hedin's Recent Journeys in Tibet (with Map) 527
The Monthly Record 527
Geographical Literature of the Month 537
New Maps 545

Maps.

Sketch-map of Manchester Canal Hinterland 499
Sketch-map of Dr. Hedin's Journeys in Tibet 527
Map of the Nile Basin 548
Map of Levels along Lines of Projected Railways from the Upper Congo to Albert Nyanza and Tanganyika 548

No. 6. *December*.

Problems in Exploration. I. Western Asia. By D. G. Hogarth (with Map) 549
The Hejaz Railway. By Lieut.-Colonel F. R. Maunsell (with 7 Illustrations and Sketch-map) 570
Dr. Sven Hedin's Expedition in Tibet. By Major C. H. D. Ryder, R.E. .. 585
The Swedish Magellanic Expedition: Preliminary Report. By Carl Skottsberg, D.Sc., Leader 591
The Tribes of North-Western Se-chuan (with Map) 594
Map of Part of North-West Rhodesia (with Map) 597
Dr. Stein's Expedition in Central Asia. By Dr. M. A. Stein 598
The Recent Crinoids and their Relation to Sea and Land. By Austin Hobart Clark 602
New Instruments for Travellers and Surveyors. By E. A. Reeves, F.R.A.S. (with Illustrations) 609
Reviews:—
Europe—English Tin Mining. The Rhine 610
Africa—Tuat. African Natural History. Across Central Africa 612
America—Labrador. Climbing in Alaska 614
Polar Regions—In Search of a Polar Continent 615
General—Education. Commercial Geography 616
Short Notices 617
The Monthly Record 618
Obituary—Archibald Little. Dr. S. W. Bushell. A. J. Mounteney Jephson. Dr. Wilhelm Reiss. Rudolf Credner 629
Correspondence—The Bhot Kol Glacier, Nun Kun Mountains. By A. Neve. Asiatic Travels. By G. W. Forrest 631
Meetings of the Royal Geographical Society, Session 1908–1909 633
Geographical Literature of the Month 635
New Maps 643

Maps.

Sketch-map of the Hejaz Railway 571
Sketch-map of the Frontier between Abyssinia and British East Africa Protectorate 622
Sketch-map to illustrate a paper on Unexplored Western Asia 648
Map of Part of the Province of Se-chuan 648
Sketch-map of Part of North-Western Rhodesia 648

VOL. XXXII. No. 1. JULY, 1908.

THE GEOGRAPHICAL JOURNAL

SUMMARY OF CONTENTS.

(*For Details, see over.*)

	PAGE
Address to the Royal Geographical Society, 1908. By the Rt. Hon. Sir GEORGE TAUBMAN GOLDIE, K.C.M.G., D.C.L., F.R.S., President	1
Exploration in Southern Nigeria. By Lieut. E. A. STEEL, R.A. (*Illustrations and Map*)	6
Some Scientific Results of the Antarctic Expeditions, 1901–1904. By Prof. J. W. GREGORY, F.R.S.	25
A Contribution to the Topography of North-Western Greece. By the Rev. Canon C. M. CHURCH and Prof. J. L. MYRES (*Illustration and Sketch-maps*)	47
Captain Aylmer's Journey in the Country south of the Tana River, East Africa (*Map*)	55
The Geographical Distribution of Rainfall in the British Isles. By HUGH ROBERT MILL, D.Sc.	59
Wade's Method of determining Longitude. By E. J. SCOTT, B.A., F.R.G.S. (*Illustration*)	65
Admiralty Surveys during the Year 1907	69
Reviews	70
The Monthly Record. Obituary. Correspondence. Meetings of the Society. Literature and Maps of the Month.	

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For Notices as to the Society's Meetings and other important matters, see p. iv.

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CONTENTS—JULY.

PAGE

Address to the Royal Geographical Society, 1908. By the Rt. Hon. Sir George Taubman Goldie, K.C.M.G., D.C.L., F.R.S., President 1
Exploration in Southern Nigeria. By Lieut. E. A. Steel, R.A. (with 6 Illustrations and Map) 6
Some Scientific Results of the Antarctic Expeditions, 1901–1904. By Prof. J. W. Gregory, F.R.S 25
A Contribution to the Topography of North-Western Greece. By the Rev. Canon C. M. Church and Prof. J. L. Myres (with 1 Illustration and 6 Sketch-maps) 47
Captain Aylmer's Journey in the Country south of the Tana River, East Africa (with Map) 55
The Geographical Distribution of Rainfall in the British Isles. By Hugh Robert Mill, D.Sc. 59
Wade's Method of determining Longitude. By E. J. Scott, B.A., F.R.G.S. (with Illustration) 65
Admiralty Surveys during the Year 1907 69
Reviews:—
EUROPE—English County Bibliographies. ASIA—Himalayan Exploration. AFRICA—The Eastern Desert of Egypt. French Central Africa. South Africa. AMERICA—South American Rainfall. AUSTRALASIA AND PACIFIC ISLANDS—The Western Pacific. Australia and New Zealand. POLAR REGIONS—Arctic Researches. GENERAL—Some Remote Islands. SHORT NOTICES 70
The Monthly Record 82

EUROPE
The Forest Populations of Central France
The Geographical Element in the Roman Road System
The Geography of the Sundgau

ASIA
Indian Surveys in 1905-06
A German Gunboat on the Upper Yangtse
Investigations in Hainan

AFRICA
French Exploration north of Lake Chad
The Relative Levels of the Victoria and Albert Nyanzas
Journeys in the North-East of the Uganda Protectorate
The Duke of Mecklenburg's Expedition in Equatorial Africa

AFRICA—*continued.*
The New Boundary between the Kamerun and French Congo (with Sketch-map)

AMERICA
Inland Waterways of the United States
Mining in Minas Geraes

AUSTRALASIA AND PACIFIC ISLANDS
Orography of Victoria
A Hamburg Expedition to the Pacific

MATHEMATICAL AND PHYSICAL GEOGRAPHY
Is the Sea-level rising?

GENERAL
Geography at Cambridge
Lectureship in Geography at Sheffield
Memorial to William Dampier

Obituary—Sir John Evans 92
Obituary of the Year 94
Correspondence—Journeys of the late W. H. Johnson. By Dr. T. G. Longstaff. The Westernmost Feeders of the Nile. By Captain D. Comyn 94
Meetings of the Royal Geographical Society, Session 1907–1908 95
Geographical Literature of the Month 101
New Maps 116

MAPS.

Map showing Greek occupation of the Macrinoros Defiles in 1829 52
General Sketch-map of North-Western Greece 54
Sketch-map of Boundary between Kamerun and French Congo 88
Map of Recent Explorations in Southern Nigeria 120
Sketch-map of the Country between Kitui and the Tana River 120

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The

Geographical Journal.

No. 1. JULY, 1908. Vol. XXXII.

ADDRESS TO THE ROYAL GEOGRAPHICAL SOCIETY, 1908.*

By the Rt. Hon. Sir GEORGE TAUBMAN GOLDIE, K.C.M.G., D.C.L., F.R.S., President.

As this annual meeting is to be immediately followed by a special meeting to consider a change in our bye-laws, for which purpose the presence of at least a hundred Fellows is necessary, and as one cannot reasonably ask from you an inordinately prolonged attendance here this afternoon, it is necessary for me to reduce materially the length of the annual address from that usually adopted both by my predecessors and myself.

Let me first deal briefly with certain questions connected with the growth, both in quantity and quality, of geographical education in this country. Our older Fellows know that the successive Councils of the Society have, especially during the last quarter of a century, made strenuous and unceasing efforts to revolutionize the general position of geography in our national scheme of education. If the Royal Geographical Society had done no other work, it would have amply justified its existence by the success of its labours in this single direction. No one will misunderstand me as endeavouring to conceal or lessen the credit due to our great universities, to other institutions or associations, or to individual geographers not directly connected with our Society, for the important part that they have played in the remarkable movement of the last twenty-five years, which has gradually transformed geography from the Cinderella of the sciences into a respected and sought-after branch of human knowledge; but I fear no contradiction when I assert that the Royal Geographical Society was the initiator, and has been the constant mainspring of that great movement. In my

* Delivered at the Anniversary Meeting, May 25, 1908.

address a year ago, I brought to your notice the efforts we were then making to secure for our subject its proper place (which it had never before had) in the Civil Service examinations, and I indicated the reasons for attaching very high importance to this question. Since then, as you know from the Press, our efforts have been completely successful, thanks to the cordial co-operation of certain of our great universities, and to the wide views taken on this matter both by ministers of the Crown and by the Civil Service commissioners. The effect of this change on the attitude of educational institutions towards our subject is already considerable. It cannot fail to be both widespread and deep unless the instinct of self-preservation should lose its force, which I see no reason to anticipate. Before I leave the subject of education I would remind you that quite recently the University of Edinburgh has established a readership in geography, and that the first occupant of that chair will be our distinguished Fellow, Mr. Chisholm, whose absence from London will be constantly regretted by our Society, and that the University of Sheffield, under the care of its vice-chancellor, Sir Charles Eliot, and with the aid of that liberal citizen, Mr. Allen, has established a lectureship in geography, the first selection for which has not yet been made public. Lectureships in Glasgow University and other parts of the country are, I believe, likely to be established before long. I must also refer briefly to an effort now being made by that strenuous and able geographer, Mr. Mackinder, to establish an effective London School of Geography, mainly for teachers, within his highly successful School of Economics. This effort has the most cordial moral support of our Society, and though the many and varied calls made upon its limited means prevent the Society offering to Mr. Mackinder's scheme direct pecuniary support, yet we feel that the relatively small capital sum which is required to equip the proposed geographical department will be obtained without difficulty.

I will now deal concisely with the main features of exploration during the last twelve months.

Perhaps the most notable event has been the departure of the expedition, under Lieut. Shackleton, for the resumption of work in the Antarctic Regions. He has safely landed, with all his staff and his equipment, at a point near the old headquarters of the *Discovery* Expedition. There is reason to believe that Mr. Shackleton will soon be followed by other expeditions. Dr. Charcot will take his departure in August, his main object being to explore the region between King Edward VII. Land and Graham Land. Dr. Bruce is endeavouring to obtain funds for a fresh effort, and there is reason to believe that other expeditions are in contemplation; so that, within the next three or four years, we ought to have made very solid progress towards the solution of the remaining unsolved problems of Antarctic geography. During the last twelve months the Natural History Museum has issued

a volume of the scientific reports of the National Antarctic Expedition, and other volumes may be expected very shortly. Our Society has just issued the admirable charts of the expedition which have been prepared by Lieut. Mulock.

Turning to the North Polar Region, we have to note the return of Mr. Harrison from his attempt to penetrate into the Arctic ocean, with the expectation of discovering a great extent of land. He was unable to carry out his scheme completely; but he has contributed considerably to our knowledge of the oceanic conditions between the mainland and Banks' Land, and has also done valuable survey and other work along the Arctic coast of America. Mr. Mikkelsen, who had the same end in view, has met with various disasters, which have unfortunately prevented him from accomplishing his designs. Dr. Bruce has given to the Society an address on his work in Spitsbergen, under the auspices of the Prince of Monaco. On the other hand, the Duke of Orleans has been unable to favour us with his promised lecture on the important researches which he accomplished in the Novaya Zemlya region.

Asia is so overrun with expeditions of all nationalities that only very brief reference can be made to them. Dr. Sven Hedin is pursuing his successful career as an explorer of the unknown and less known regions of Tibet and Central Asia. He will have a rich harvest to lay before the world on his return, which, it is hoped, will be this year. There is every likelihood also, that our accomplished Fellow, Dr. Stein, will return this year, to tell us the story of the remarkable discoveries which he has been making in Eastern Turkestan and the borders of China. As Dr. Stein's work is always of the most thorough character, and as he has the assistance of that able surveyor, Ram Singh, his contributions to geography are likely to be of the highest value. I would draw your attention to the publication, during the past year, of Mr. Ellsworth Huntington's remarkable book, entitled "The Pulse of Asia," a work of great interest to those who wish to realize the important bearing which geographical conditions have had on human history and human enterprise in Central Asia. Our knowledge of the Himalayan regions has been considerably extended during the year by the explorations of Dr. and Mrs. Workman, of Dr. Longstaff, and of Messrs. Rubenson and Monrad Aas, and we may expect further important additions to our knowledge of Central Asia from the expedition on which Captain Kozloff has recently set out, while we shall be interested to see the detailed results of Dr. Tafel's work in Eastern Tibet. You may be interested to know that the Society has now in hand, with the assistance of Colonel Maunsell, a new map of the whole of Turkey in Asia.

Africa is still flooded with explorers; but, as might be expected, these explorations are becoming of a more and more special character,

seeing that the pioneer work has been practically accomplished. The French, especially, are showing praiseworthy zeal in the exploration of the Sahara, and one of the most interesting expeditions of the past year was that of M. Felix Dubois, across the Sahara to the Niger. Not less important was that of Captain Arnaud, from Algeria to the coast of Dahomey. Captain Lenfant has been doing excellent work between the French Congo and Lake Chad. Dr. Leo Frobenius has entered upon an expedition likely to be fruitful in results from Senegal (by the upper Niger) to the Lower Niger and the Kameruns. In East Africa, Dr. Jaeger has been doing careful work between Mount Kilimanjaro and the Victoria Nyanza. Further south, the elaborate expedition under the Duke of Mecklenburg is covering the ground about Lake Kivu. Our own Society has given substantial support to an interesting piece of work in connection with the Anglo-Belgian Survey in the Ruwenzori region. By the sanction of the authorities, the British members of that expedition have been allowed to undertake the geodetic measurement of a section of the arc, which it is hoped will ultimately be included in a complete geodetic network from the Cape to Cairo. Finally, so far as Africa is concerned, I will draw attention to the remarkably able paper contributed to the *Journal* by Mr. Lamplugh on the Gorge of the Zambezi river.

In South America, Major Fawcett has been re-engaged by the Bolivian Government to carry out the work of delimitation along the frontiers of that country. From the original maps which he has placed at our disposal, it is evident that he will carry out this delimitation with complete competency, and that when his operations are completed, he will have added substantially to our knowledge of the geography of that particular region. Major Fawcett's map will be of great service in the preparation of a new map which the Society has undertaken of a section of South America, embracing part of Bolivia. So far as Central America is concerned, Dr. Tempest Anderson's interesting paper on Guatemala must have been to many of us a revelation as to the real character of the physical geography of that Central American country. At the southern end of the continent, we learn, from communications which have just been received from Dr. Carl Skottsberg, that as commander of the Swedish Magellanian expedition, he has been doing excellent work, both in Tierra del Fuego and in the Falkland islands. I may, perhaps, remind you that the Surveys of Canada and of the United States are rapidly mapping the whole of those regions, while excellent work of the same nature continues to be done by Argentina and by Chile, and, we have reason to believe, by Brazil.

The same may be said of Australia, the various states of which have competent Surveys, although there still remains a considerable amount of pioneer work to be done in the interior, and in this respect the journey of Mr. Canning across Western Australia deserves to be mentioned.

The Society during the past year has contributed to an expedition which is at work, under Mr. Rivers, on the island of Guadalcanar, in the Solomon group, from which we expect interesting results in anthropogeography. No less interesting results may be expected from Mr. Louis Becke, whom the Society has also subsidized, and who intends to take up his residence for a considerable period in Bougainville island, one of the same group. Mr. Becke will have with him a competent New Zealand surveyor.

I have not time for more than a cursory reference to the subject of geographical research. At our ordinary meetings we had Dr. Nansen's lecture on North Polar Problems, Mr. Mackinder's on the Geographical Conditions affecting the Development of the British Empire, Mr. Chisholm's on Inland Waterways, and Mr. Gomme's on the Story of London Maps. Nor must I omit to mention Dr. Mill's six lectures on the "Geographical Distribution of Rainfall in the British Islands," which were so highly appreciated and so well attended that they had to be given in the usual hall instead of in the map-room, as was originally intended. Our Research Department has had before it such subjects as Dr. Woolacott's investigation of the "Origin and Influence of the Physical Features of Northumberland and Durham," Dr. Owens's paper on Sea Currents, Lieut. Vivian Thompson's account of the very successful method of Stereo-photo Surveying, Mr. Reeves's account of his New Distance Finder, and the report by Dr. Strahan and his colleagues on their Rivers Investigation.

Those who desire fuller information, either as to the progress of exploration or our Society's efforts in geographical research, will find it in the pages of our *Journal*, which, owing to the labours and experience of Dr. Scott Keltie, continues to hold its position, acknowledged by the highest geographers of other countries, as the first geographical journal of the world. And I desire to take this opportunity, which I may never again have, of once more emphasizing the great debt which geography in general and this Society in particular owe to Dr. Keltie's labours, whether as editor of the *Journal* or secretary of our Society. The same reasons impel me to bring before you again to-day the valuable services which continue to be rendered by the other heads of departments; Mr. Reeves, in his triple capacity of cartographer, map curator, and instructor; Mr. Heawood, as a most admirable librarian; and Mr. Evis in the post of chief clerk, which he has held for a quarter of a century, to the great advantage of the Society. Nor can I leave this chair without a just tribute to the numerous officials who work under these three heads of departments. It is in no spirit of empty compliment, but with a just appreciation of the experiences of three years of constant observation, that I assert that the Royal Geographical Society is well and zealously served by all in its house.

EXPLORATION IN SOUTHERN NIGERIA.*

By Lieut. E. A. STEEL, R.A.

DURING the years 1904 to 1908 a large tract of hitherto unexplored country, roughly an area of 3500 square miles, in the hinterland of Southern Nigeria, has been brought under Government control. The part dealt with in the following pages is that portion between the Niger and Cross rivers (with the exception of a narrow strip along the banks of the latter), and north of the Bende-Owerri road. This portion has never before been visited by any white man, or even any responsible black man, as far as could be ascertained, and owing to the reluctance of the various tribes to admit any one into this country, expeditions are very necessary to enable any progress to be made at all. Furthermore, the tribes delight in attacking those surrounding tribes who have been brought under control and disarmed, and are thereby an easy prey for them. This state of things naturally cannot be tolerated, and consequently, before any useful results can be obtained, this process of "disarming" has to be gone through, which they only submit to sometimes after considerable resistance. Further away to the north are still more pagan tribes of whom very little is known at present, except their reluctance to have anything to do with the Government, or allow any one into their country: that they are full of self-assurance is evident from the insolent messages and presents of guns and gunpowder which often arrive by emissaries for the nearest political officer, expressing the hope that the "white man" will "*now*" not fear to come, for "we are ready to fight him." The most dreaded of these tribes, at any rate by their enemies, are the Munshis on account of the deadly poison with which they smear their arrows. Its effect is so deadly that death invariably ensues within a few minutes after the arrow has pierced the skin.

Another warlike race are the Ihnis, directly bordering on the area about to be described, but these tribes will require "individual attention" later on on account of their intractability, and their southern boundary has so far always been the northern limit of any active operations, on account of the enormous area affected should they be interfered with. *Festina lente* is the rule in these parts. So, to return to the area and people under consideration, having neighbours of this description, it is not to be expected that they themselves should be much better.

The people of this region may, as a whole, be described as savages. They all are related in some way or other to the Ibo race, which is the predominant race east of the Niger, though the several tribes met with each has its own dialect. Those bordering on the Niger and Cross rivers, who have had the advantage of coming into contact with civilization,

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* Read at the Royal Geographical Society, March 9, 1908. Map, p. 120.

and are supposed to be under Government control, only continue their barbarous customs secretly; but as we gradually get further inland so do the people become worse, until we get to the Onichas, Ahiaras, Obowus, and such like, amongst whom human life is held extremely cheap. But before proceeding to describe their country and characteristics, it is necessary to say a few words about the "Aros," who are scattered all over this part, sometimes in twos and threes, sometimes in settlements, from the Cross river to the Niger. Their influence is predominant over these pagan tribes, and as they have no good to say about the Government, their presence is a continual thorn in the side of the administration. They derived their power from the notorious "Long Juju," situated in a ravine near Arochuku, and no important dispute could be settled save by reference to this oracle. As the tribe supposed to be specially favoured by it, the Aros were able to make gain of it, both by propitiatory offerings and slaves. It also gave them power to penetrate and work their baneful influence upon these superstitious tribes of the interior, who otherwise would admit no strangers to their country, and also the power of removing any one opposing or "even desirous of opposing" their authority. This dreaded Juju oracle at Arochuku was destroyed during the military operations of 1902, but not so the Aros, who immediately gave proof of their superior intelligence and "power" by adapting themselves to the new conditions of British administration, and living by the proceeds of systematic blackmail on the easily beguiled natives. This is one of the chief difficulties that an exploring expedition has to contend with, for it takes years of tactful administration to dispel this Aro influence. These latter are easily distinguished by their intelligence and superior clothing from the local natives. It would be very interesting to know the past history of these Aros. How came they to be considered specially favoured by the Long Juju, and also superior to all their neighbours, both intellectually and physically?

Having thus described the "influences" which were already at work in this region before our arrival, and the tribes on its borders, let us return to Onicha, on the banks of the Niger, which was then the headquarters of that portion of the Protectorate, and from where the first expedition, consisting of about three hundred officers and men, made its start. The portion allotted was a stretch of country from Ogrugu to Oguta, and about 25 miles inland from the Niger, over 1500 square miles. Most of this was unknown, the inhabitants refusing to permit either Europeans or native traders into it, though they carried on a considerable trade themselves through middle men with the various "factories" on the Anambara creek, Niger river, and Oguta lake. A start was made from Ogrugu, on the Anambara creek, in November, in a southerly direction, and a halt was made at a town called Obukpa, the most important in the district, on the second day. From here small

parties were sent out, once opposition had ceased, and the country mapped by means of compass and measuring wheels. Having more or less fixed points in Ogrugu, Onicha, and Oguta, the work presented little difficulties, and in January an advance was made to Enugu. Here the main column stayed a couple of months, carrying on the work of mapping, and a site for a new station was chosen at Oka, 25 miles east of Onicha. February and March were spent at Umugi, and the country between it and Oguta mapped. This part of the country was found to be very low, and is inundated during the rains. Owing to the dense population and thick nature of the bush, and there being no roads, this work of mapping was very slow, for it is quite easy to pass within a few hundred yards of a village and not know of its existence. It was quite impossible at any time to get a view at all, or any compass bearing of distant objects.

In April the work of the column ceased, owing to the hot weather and the rains, when travelling is impossible, with the exception of consolidating the work done, correcting names of towns, settling tribal boundaries, etc., till the following November, when a large expedition of over seven hundred rank and file was concentrated, half at Oka, and half at Bende. The map being a blank, no definite instructions could be given as to the route to be followed by each column. The initial idea of the officer commanding was that each column should start at the same date from these two places and effect a junction at some suitable imaginary point, Z, the bearing of which from each place was settled beforehand. The point Z was chosen with due regard to political and geographical reasons. It should, if possible, be on the northern boundary of the Ahiaras and Onichas * and Obowus, which would facilitate dealing with these truculent people, as it would then, with Bende and Owerri to the south, form a triangle of posts round the country; it should also be fairly central for mapping the country, and, if possible, situated on the river Imo, which was known to run through these parts, and which forms the eastern and western boundaries of the tribes along it. The column from Oka, moving in a south-easterly direction, passed through magnificent undulating country, fortunately meeting with little active resistance. No halts were made except for the night, when the day's route was mapped and the approximate position noted. The method of sketching employed, viz. with prismatic compass and "perambulator" wheel, proved very satisfactory, as the latitude and longitude of Onicha and Bende were fairly accurately known. After five days' marching this column arrived at Z, the actual meeting being facilitated by means of star shell, which were fired at night by the Bende column from Z, where it had arrived two days previously. Its progress had not been

* Onicha, Onitsha, or Onitcha, is a very common name in these parts. They have nothing to do with each other.

so uneventful, for two days' march outside Bende the natives of Nkpa set up a stout opposition. They were easily driven out of their stockades, but the question of guides became serious. Even when a native was caught, he professed to know nothing about the next town, either its name or the way to it, saying he had never been out of his own compound. This to a certain extent was found to be true, for in these parts it is as much as any native's life is worth to leave his own village. He is kidnapped and sacrificed, and then tied up on to a sacrificial stake in the market-place in order to keep the "white man" out. Consequently there is no trade, no paramount chief; each village being

ONICHA LANDING-PLACE ON THE NIGER RIVER.

entirely on its own and ignorant of its neighbours. They do not fight each other—they are too great cowards for that—but simply lie in wait for any unfortunate neighbour who happens to stray beyond his boundary. Consequently, the third day out the column had to find its way in the dark, as it were, a halt being made every few hours to plot out the position on the map. An advance was then made by the bush path whose direction seemed to correspond best with the bearing of Z. By midday the column arrived at a large market, where a human sacrifice had just been completed. Here a halt was made, and as it was imperative to catch some one who could tell us where we were, a party was sent out for this purpose. A tremendous noise began on all sides, guns going off, war-horns being blown, to call every one together, and shouting, this being to frighten us away. Eventually the party returned

with a very decrepit old woman (the men had all run away), who, as soon as she was calmed (for she thought her last hour had come), informed us the place was Omobialla; but she knew nothing of the next place, which, according to her, contained "very bad" people. She also informed us their boundary was the great big river a little way further on, past which none of them ever dared to go. When asked who had sacrificed the human being in the market-place, she said they never did "such a thing," and it had been done by a neighbouring tribe in the night, so as to get them into trouble, and also because they thought their "Juju" wouldn't let the "white man" pass through if they sacrificed to him! So having admonished the old lady to guide us properly, the column advanced. The river she had spoken of was no doubt the Imo, and here we should find Z, be able to link up with the Oka column, and shake off the uneasy feeling of wandering about in a hostile country, not knowing where we were.

After half an hour's march along a gradually descending path through dense bush, the column reached the river, which was here unfordable, and only to be crossed by a rotten suspension bridge of tie-tie, which the natives on the opposite bank were just beginning to cut down. We had surprised them, so they contented themselves with keeping up a heavy fusilade from the opposite bank, and were only driven off by a large party crossing by a ford higher up and taking them in flank. It was late in the afternoon when the column crossed over, and here, in a nice clearing, we formed a camp, which from our map turned out to be approximately Z. Here we had to wait till the Oka column arrived, the time being spent in making a large base camp, trying to get information of the surrounding country, and guides. It was most difficult. Every native we happened to catch "of course" had never been outside his village. All they knew was that every one all round were "very bad" people. On the fifth day the Oka column arrived, but our plans were at this time altered by the news that Dr. Steward, who was starting from Owerri to go to Calabar, had taken a wrong road, and ridden on his bicycle into the very Ahiara and Onicha country, *i.e.* north of the Bende-Owerri road, which we were about to deal with, and had been cruelly murdered. Consequently the whole attention of the columns was concentrated on this portion first, viz. the triangle Bende-Owerri-Z.

It was not till the end of February that this portion had been properly mapped and pacified, as well as a portion eastwards, and a start westwards was then made. The objective was the Awo country. Here another camp was made, and a small column left to map this portion and join it up with Oguta and Owerri, whilst the headquarters and remainder marched north, and another base camp was made at Eziama, which the Oka column had passed through in November. The river Imo was found to be very much smaller here, only about 3 feet

deep and 20 feet wide. This river, called the Opobo in its lower reaches, is one of the largest in South Nigeria, and consequently the finding of its source, according to the natives quite close, was an object of especial interest. With this object in view, a party went out, and after marching 7 miles across hilly country, the town of Omaka was reached. On the far side we suddenly came to a deep ravine; descending the precipitous and thickly timbered ground, we found a huge rock, at the base of which three springs welled out, converging in a few yards into one. This rippled over the rocks for a few yards, then fell clear away some 30 feet, and ran away down the ravine.

WASHING DAY ON THE NIGER RIVER.

At the bottom of the waterfall were numbers of Juju houses with painted guardian images, supposed to protect the waters. The whole was fenced round with the utmost care, for the natives hold it in the greatest awe and superstition.

The next two months were spent in sketching the country round Eziama, and joining up the surrounding country we had already done. On April 30 operations ceased, for the hot weather had set in; besides, every one had been six months hard at it, and all were beginning to show signs of fatigue. A site was chosen at Omoduru for the new station, from which this district was to be administered, and the expedition broke up, one company being stationed at Omoduru, to look after the newly pacified tribes. During the rainy season, June to September, no fresh work was possible. During the dry weather 1906–1907, several

small parties were continually out consolidating the work, which had been already done somewhat hurriedly—necessarily so when under active service conditions. The names of several towns which had been put down wrong the previous year were corrected, and, most important of all, the tribal boundaries were all settled. A little piece north-east of Eziama, up to the Ihni boundary, was further mapped, this marking the limit possible, for the Ihnis don't intend to let any one sketch their country without a fight.

Relief of Land.—What is the nature of this country between the Niger and Cross rivers? It may be summed up in a very few words. It is entirely bush country, though perhaps not so dense in some parts as nearer the coast, and open patches used for cultivation here and there are met with. No view of any of the country was obtained until we arrived in the Uturu district to the north-east. Here the character changes. Hills of from 1000 to 2000 feet and grass country, and low scrub with an occasional patch of forest, relieve the monotony of the gently undulating bush country, and the accompanying suffocation that seems to pervade it. Mountains there are none; the highest known hills (Oban hills) in the colony are barely more than 2000 feet high, and standing on one of these hills in this Uturu country a superb view is obtained—a great forest occupies the valley in the foreground; no village or farm-clearing, not even a solitary hut, intrudes upon the vast loneliness of the scene. Away to the north and north-east, as far as the eye can see, rise innumerable peaks, probably reaching 5000 feet in at present unknown country, predominating over the lonely valleys that lie at their feet, while in every other direction the whole land is enwrapped in an impenetrable mantle of bush and forest growth that characterizes the West Coast. Here we had found indeed the dividing line. There is only one river of any importance in this area, the Imo, the source of which we discovered. This river never dries up, and always has a respectable flow. In the rains it swells tremendously and overflows its banks for miles. There is, however, nearly always water to be found everywhere; small streams which rise very suddenly and are to be found in almost every depression in the ground, owing to the tremendous rainfall and the saturation retained in the "bush." Two other rivers, the Njaba and Orashi, were both traced to their source, and were found to end in a succession of pools in the dry weather. They both flow into the Oguta lake, and in the rainy season the Orashi, which flows on into the Niger, swells to such an extent that large steamers come up into the lake and carry down the year's supply of palm oil that is collected at Oguta.

The soil in most parts is distinctly fertile, being a rich reddish loam, which is improved by being manured by a wood-ash produced by the periodical burning of the bush. This is general all over the country. On the slopes and summits of the hills the surface is scattered over with

many stones and boulders of rock, and in the Uturu and Bende district an extensive series of sandstone and igneous rocks were met with. The soil in all the marshlands and lowlying parts is black with successive layers of decayed vegetable matter. This whole area may be described as decidedly poor in vegetable products. There is practically no timber of any size or importance, except in close proximity to the banks of the Niger and Cross rivers. Here nature has thoughtfully supplied the mahogany, awosa, and oroko tree. The two former are used by the natives for making their canoes, while the oroko tree supplies the timber for every kind of building in the colony. Towards the Cross river side are also to be found ebony and camwood. A con-

ON THE CROSS RIVER.

siderable trade is done in the latter, its red dye being used to paint the body in certain social and religious observances. Rubber is confined to the same area; it is practically unknown in the interior. Here, too, we see the number of the oil palms—that source of wealth of the whole West Coast—gradually diminishing. Towards both these mighty rivers it flourishes abundantly; but as we trace it towards the interior, and also northwards towards the Uturu and Oka country, so it gradually diminishes, and the natives only obtain enough for their daily consumption. The cotton tree is common all over, nearly every market-place having an enormous cotton tree. At its base the trunk throws out huge buttresses, sitting on which the young "men" spend most of the day, smoking and drinking, while their "mammies" do the work. Fruit

trees grow all over, though their products are inferior to those grown by more civilized tribes. These include the banana, coconut palm, lime, pineapple, plantain, and paw-paw. In the interior the pineapple grows wild, and borders both sides of the bush paths where it is not suffocated by the overpowering bush. These pines, though, never become palatable to the European. Fields of ground-nuts are cultivated in several parts. Maize is cultivated everywhere in small patches, and generally in conjunction with yams, chillies, cassava, and coco-palms, for the native likes to grow everything he wants in the one piece of land he has cleared for the production of the season's supply of yams, the staple food of these people. Sugar-cane is also indigenous.

Southern Nigeria is a poor hunting-ground—this portion especially so. Very few elephants have ever been seen here, though very large herds exist in the delta regions to the south and also to the north, where they are hunted by Hausa hunters. The West African baboon inhabits the forested portions, and is described by the natives as being big enough to kill an unarmed man. Such a one, however, we never saw. With some they are looked on as sacred. The Anambara creek, on the extreme west of this area, affords the best shooting obtainable, and here the hippopotamus and buffalo are met with. At times we came across a few herds of bush-buck and a fair amount of francolin and Guinea-fowl, but taking it all round it was a very poor game district. None of the larger buck (*Cobus Cob*) met with much further east were seen. Their domestic animals include very inferior goats, sheep, cows, pigs, and fowls.

White ants abound, the queen and the cell in which she is encased being often brought for sale, and are eaten by the natives in these parts. They are a terrible scourge, and no wooden structure seems proof against them. The driver-ant, too, is a great nuisance; these creatures travel in immense hordes, and are so destructive of all living creatures that come in their way that they drive everything before them. One morning we found our chicken-run entirely denuded of chickens by a midnight raid of these insects during one of their migratory periods, and another night we were all awakened by the noise of the goats and sheep, about fifty, which were attacked in their pen. We only managed to save a few of them.

The typical characteristics of the various tribes in these parts are, in the main, those which are common to all savage peoples. Their average physique is decidedly inferior to other black races, though, being almost nude, they appear to be taller and bigger than they really are. There are some exceptions, and the reason for these can be attributed to the influence of geographical conditions, or their different modes of life. The natives of the Onicha and Oguta districts, on the Niger are tall, well shaped, and active, no doubt due to their more energetic life, for they are keen traders and good watermen. The

colour of their skin is a dark chocolate, freely marked with tribal cuts. Here and there one has a coal-black skin, which is much admired by the natives themselves, and, being kept clean by daily baths, is smooth and shiny. The Oka people, bordering on the Onicha district, and the Bende people in the south-east of this area, and the Elugus to the east, represent also fine specimens of natives, and this may in a way be due to the comparatively hilly nature of their country—Bende particularly so. Oka, which was established in 1905, is also the head-

WOMAN FROM THE INTERIOR, AHIARA COUNTRY.

quarters of a very large community of blacksmiths and coppersmiths, and men from here are found in the most distant parts of the Protectorate. The Bende natives are well known everywhere for their extraordinary physique, and are used in preference to any others as "carriers." If there is any manual labour required, such as for road-making and clearing forest, it is always more economical to bring a few hundreds of Bendes than any amount of local labour. These people have few of the characteristics of their neighbouring tribes. They are

extremely tractable, hard working, and civil; they hardly indulge in barbarous customs, their faces are barely marked, and they have few superstitions—ideal qualifications indeed in a savage race, but, unfortunately, there are too few of them, for their country only extends over an area of about 300 square miles. Here again is an interesting study. How came these people, surrounded by the most despicable savages in the world, to be so superior? Surely it cannot be due entirely to the advantage they have of living in a hilly district. The other tribes, which include the Ahiaras, Onichas, Obowus, Nkwerris, Awos, and which occupy the interior, are in a very low ebb of civilization. Their skin is much lighter than usual, being of a dirty mud-colour. They have no occupation, for they won't indulge in trade, and the surrounding tribes will have nothing to do with them. However, since their country produces their daily wants, which are few, they are able to do without their patronage.

The work of cultivating the ground just sufficient for their needs is done by the women and children, while the men do nothing but eat and drink and sleep and enjoy themselves. They have no physique, no intelligence; their habits are of the dirtiest description, and nothing gives them so much pleasure as the sacrifice of human blood. At sunset the day for these people begins. It is then that the young men go out to fetch their pots of "tombo"* (or palm wine) down from the trees (they will not trust the women to do it), and on their return it is carefully put away to ferment. When it is dark the fun begins, and the night is spent in drinking and dancing to the accompaniment of tomtoms. In the early hours of the morning they stagger to their huts and sleep on till about midday, when their food must be ready for them. After that they will proceed to one of their favourite market-places, club-houses, or Juju-houses, and gossip and smoke till sunset. When the supply of tombo is finished, an early rise is necessary to replace the pot at the open mouth at the top of the palm tree. Dancing is the only form of exercise these people indulge in.

A lot has been written about the gin traffic on the coast, and how it is ruining the natives. Amongst these last-mentioned tribes the consumption of gin is infinitesimal compared to the amount consumed by the natives in any other part of the Protectorate, and yet they represent the lowest type in every respect to be found anywhere, though they are offshoots of the predominant Ibo race. Some philanthropists would have us believe that this imported gin is the ruin of the natives and the cause of their degeneracy, yet how comes it that their brothers of the interior, to whom gin is a luxury, are far more degenerate than they

* This is the same as toddy in India collected by the natives from the toddy palm tree. When the oil palm grows old it gives out the palm wine, which is drawn to the top by the heat of the day's sun, and trickles into pots placed suitably for it.

have ever been? The reason is this, that this palm wine, when left to ferment, is much more harmful than any amount of gin, and far better it is that they should buy gin, which is an incentive to trade at any rate, than that they should lead the lazy life of these people, who find in this fermented palm wine an ever-ready means of immediate excitement, and under the influence of which they commit every form of atrocity.

Festivals.—In the main, these people keep the same festivals as those

GIRL FROM THE OGUTA COUNTRY.

in other parts: (1) The planting of the yam; (2) the eating of the firstfruits of the crop; (3) the worship of the new moon. All these are made the excuse for orgies. Various kinds of personal adornments are indulged in. The ladies of both the Onicha and Oguta districts on the west, and also of the Afikpo district on the east, spend hours adorning each other's hair. It is plastered up with palm oil and grease into most fantastic designs, and remains in that condition for months; the tribes of the interior do not indulge in any more than

merely painting their bodies and faces by way of adornment, though both sexes have some charm either round their necks or waists, consisting of a string or strip of leather, on which are threaded either cowries, coloured stones, or human and animals' teeth: It is usual to tie something of this sort round the necks of their cattle and sheep, which is supposed to protect them. Some young girls have a stick or tooth of some animal, and in the north part, where copper and iron are smelted, a piece of metal, through the upper lip; this is supposed to favour child-bearing. The most remarkable bracelets are those of ivory, being sections of elephants' tusks, which indicate that the wearer is a person of wealth and importance. Most chiefs in the Afikpo and Bende districts, and also in the western districts, have either an ivory bracelet or anklet. Anklets of ivory, brass, copper, cowries, are worn by both sexes of the Niger and Cross river tribes, and also in the Oka and Uturu country. The interior tribes, being very much poorer, and having few relations with their neighbours, and somewhat cut off from the source of supply of these luxuries, have to be content with body-painting. Paints are made by the natives from indigenous vegetable products, black, white, red, and yellow. They are used either: (1) for ornaments before a festival; (2) as "medicine" in case of sickness, or a social or religious ceremony; (3) or during the initiation and fattening process of girls prior to marriage (this amongst the more civilized only).

A wounded man of the Onichas was once brought into camp only after his friends had been treating the wound with every colour of paint. The wound, originally a slight one, had spread all over his body as a consequence, and was incurable.

Superstition.—The natives of these parts are extremely superstitious, and this does not only apply to the pagans, but also to those who have been brought up in civilized surroundings. As already mentioned, most of these natives wear some kind of charm round their neck or waist in the belief that they are thus protected from illness, or death from their enemies. When, however, the talisman has lost its supposed power, and its wearer feels the hand of death upon him, he submits to his fate—he is wanted by the fetish. To many places and things they attach a superstitious veneration. The rock found at the source of the river Imo is considered sacred, and as such is carefully guarded. Every village has its sacred grove, surrounded by human skulls, chatties, and rotten eggshells on sticks. They believe that a spirit haunts the locality of a murdered man, or their sacred grove at night, and no native would pass near such a place during the darkness. Any unusual phenomenon is by them attributed to a supernatural agency. Not only has a village its good spirit, but also its evil spirit, and when any misfortune of any kind overtakes a village, a process of driving out the latter is indulged in with the help of much noise, and every one beating the walls of their huts with sticks.

When we entered this country from "Bende" in 1906, we fired a "star" shell, to try and communicate with the column marching from Oka. This was seen by the natives for miles around, and its effect was extraordinary. The Ahiaras, Onichas, and their war-like friends, who had spent years building the most marvellous trenches and stockades to guard every possible approach to their country, told us they had meant to give us a very warm time, but the star shell was too much for them. Any one who could do this must be supernatural, and they fled into the

GIRL FROM THE OKA COUNTRY.

bush and kept up a guerilla warfare for months, never daring to show themselves. Others from the north, doubtful at first as to whether they should fight or not, came in to see the "white" man, and asked what they could do to be saved. As another instance, a boy of mine said he couldn't possibly come out after an elephant with me till he had been to his village and got some "medicine" which would protect him. And as a last instance, in January, 1906, when a small column was operating in the Ohonhon country, north-west of Bende, it had a lot of trouble

with a town called "Omo Oga Ngolori," the reason given being that when the Long Juju of Arochuku was destroyed in 1902, it was brought to this place as being out of reach of the Government, and the Aro priests tried to re-establish it here, and carry on their former customs. At any rate, it was reported to be a most powerful Juju, and meant certain death to any one who entered. A visit was made to it (no native would show us further than the entrance, which was an oval-mouthed cave in the rocky side of a hill). All round were sticks stuck in the ground supporting skulls, eggs, bones, while blood was splashed over the walls; on the right of the entrance was a large basin of water about 18 inches deep, hewn out of the rock, in which water trickled through from the roof, and in which a few fish glided about. These, we were afterwards told, were the same fish as were brought from Arochuku, and are held in great awe. Further on stood a large long-shaped war-drum, hewn out of a tree-trunk on the ground. On top of it was a slit, over which the necks of victims to be sacrificed were cut. Whilst examining this one of the officers made some remark, setting up a series of echoes, which resounded from the walls of the cave. It certainly was most queer, and was altogether too much for the few soldiers and others who out of curiosity had followed us in, for they dropped their carbines and fled out.

Marital Relations.—The marital relations amongst these peoples vary somewhat according to their state of civilization. Amongst all polygamy is the rule, the reason given by the natives being that it is impossible for one woman to do all the work of the house, look after the children, prepare and cook the food, fetch the daily supply of water (often an arduous job), cultivate the plantation, and go to market. And the reason is that the African is an exceedingly hungry person. It is their custom to eat several times a day when at home, and the men spend most of their day sitting in the palaver house or market-place, while the women bring the food all day long. One wife could not possibly do this. Besides, the African lady encourages it, for she says, "The more wives, the less work." Amongst the Ahiaras, Onichas, Obuwus, and the lower class of pagan tribes in the interior, there is very little form of marriage. As soon as a man has the means, he pays the parents what they want, in the shape of goats, cows, beads, money, and takes the girl. There is no ceremony at all. The more wives he has indicates a richer man, and that he will be better looked after. If, of course, they can manage to seize a woman from the neighbouring tribe while she is fetching water or working on her farm, so much the cheaper. With this method in vogue for centuries, no wonder that it is as much as a native's life is worth to go out of his own village, and that the country is so backward. With the tribes of the Bende, Afikpo, Oguta, and Onicha districts, a girl is betrothed to a future husband when only a few years old, he giving her presents from time to time as

well as her parents. Infant marriage is apparently not in vogue at all. Before a girl reaches a marriageable age, she undergoes the fattening process, during which she is generally painted in some way, after which she is painted over with red camwood by her husband. The various tribes intermarry very little. Twins are regarded with terror from the Niger to the Cross river with very few exceptions. With these tribes in the interior, it was the custom to kill them and the mother too. With the river tribes it is the custom to drive the mother and infants out of the community; the Igaras up the Niger, to show that this custom varies, welcome twins as being lucky.

Religion does not absorb much of these peoples' time. True it is that every village has its Juju house, sometimes several, generally clean, well kept, and every compound has its deity, but if you ask these people what they are for or what they do, they will simply tell you, "Our forefathers had them, and so we must." The Jujus generally consist of several very ugly carved images of human beings, all highly painted with several colours, under a shelter of some sort in every market-place, the paths to which will generally be lined with rows of earthenware chatties, rotten with age, and filled with eggs, perhaps, or bones. These pagan natives all believe in a future life of some sort—that death is only the passing from one sphere of life to another, that other being, perhaps, a sacred tree, wild beast, their own children, or perhaps their spirit may wander about frightening any one who may come across it. In fact, their beliefs are very mysterious, but they are hard to find out, owing to the unreliability of one's interpreters. The country, as at present known, has no natural resources, with the exception of the Oka district, where a little copper and iron are worked. No doubt when the country is more peaceful, a mineral survey may bring to light some valuable discoveries. North of the Bende Owerri road, and about 20 miles inland from the Niger and Cross river, the palm oil trees begin to get very scarce; and when you take the palm oil tree away from West Africa, you get a very poor country indeed, especially when you have no rubber, ivory, or timber to make up for it, and an indolent population. But there is not much of this sort of country in the Protectorate, for away to the north again, where no white man has as yet penetrated, both the country and its population improve from all accounts. Let us be content, then, with the good work that is being done here in the cause of civilization.

Before the paper, the PRESIDENT: I have to introduce to you Lieut. Steel of the Royal Artillery, who was seconded for military service in Nigeria, where he passed about four years. He is about to give us an account of his journeys in certain out-of-the-way parts of Southern Nigeria where travellers had never before been.

After the paper, the PRESIDENT: Before the discussion commences I wish to take you for one moment to two other parts of the world—to Norway, and to the Himalayas. We are honoured to-night by the presence of two distinguished young

Norwegians, Mr. Rubenson and Mr. Monrad Aas, of whom you have read in our *Journal* as having lately made a magnificent ascent of Kabru, and having thus reached an altitude greater than any living man had reached before. I cannot leave the subject of Norway without also congratulating ourselves upon the return amongst us here of His Excellency Dr. Nansen. To come back from the heights of the Himalayas to the low level of Southern Nigeria, I propose to call first upon Sir Ralph Moor, who you may remember was the Administrator of the Niger Coast Protectorate, and who, on January 1, 1900, became High Commissioner for the whole of Southern Nigeria. If I am not mistaken, he was still there when that expedition took place of which Mr. Steel has told us, which broke the power of the Arochukus. He directed that expedition as he had directed the earlier expedition against Benin.

Sir RALPH MOOR: I think I may first, as one of the audience, and on behalf of the audience, thank Lieut. Steel for a most interesting lecture, and for the very excellent pictures he has put on the canvas before us. It has been particularly interesting to me, because, as Sir George Goldie tells you, from the start of the Administration in 1891 until 1903, I was there, watching the progress and taking part in it. Lieut. Steel has told us that in that country your neighbour is always a bad man. Well, I think you may take it for granted that the white man is the worst man as far as the native is concerned, for when the native first makes your acquaintance he pretends to be your friend, and he does this because of his acquaintances in the interior, and uses you as a bogie to frighten those acquaintances.

The area shown on the map between the coast-line and the part Lieut. Steel has spoken of was dealt with during the thirteen years I was there. I suppose it represents something like 20,000 to 30,000 square miles, and when we went there first in 1891 the stations at the mouths of the river within sight of the sea were the only parts under the control of the white man at all, so much so that Calabar, the headquarters, was within 30 miles of a large slave market, which continued to be held until an expedition was undertaken against it. At Bonny, within a very short distance of the sea, there was a native tribe of cannibals, who were prosecuted with the aid of a gunboat in 1892 for eating a lady. They did not wait to kill her before cutting her up. All along that coast you could only go in 20 or 30 miles. Exploration was carried on gradually, and prismatic compass surveys made, but there was no really definite attempt to carry on survey work until 1895, when we had a Boundary Commission with the Germans, and then some real effort was made to make a scientific survey of the country. However, as the survey of the country was gradually carried on, first we had to take over the Benin country, or rather, were forced into doing so at the time when there was a massacre of seven or eight Europeans and 200 natives, which necessitated Government control being established over the country, and later the country joining, where Lieut. Steel was, was taken. The whole of that country was dominated by two jujus. The juju of Benin city extended from the Niger to the west, in former years as far as Lagos and up to the Niger. On the east side of the Niger river was the Aro juju, which extended down to the German colony and slightly to the west of the Niger in parts. The necessity for the expedition arose, and was brought to a head by an expedition of some 800 natives proceeding from the region of the Niger to appeal to the juju. They were at Aro Chuka for some two years, I fancy, when the Government was able to rescue about 135 of them, who were a miserable residue of the 800. When they came they were a most terrible sight to look upon; they were no use to sell as slaves and no use to put into the pot or they would not have been left, so they were allowed to escape. Of course that juju was an immense fraud. The natives appealed to it, and the slaves who were taken there were

always condemned to death. They were taken behind a screen into a cave similar to that described by Lieut. Steel, and then, instead of being killed, as the people who took them there supposed, they were sold into slavery; so the Aros made not only the fees which were charged for trial, but he made the profits out of the selling the men he was supposed to have killed. Lieut. Steel mentioned the juju fish, and it is reported, I gather from him, that they are now carried to a new place and regarded as the original ones. I remember distinctly, after the Aro expedition, in writing a report of it, stating at the end, that the sacred crocodiles had been killed, and that the sacred fish had been eaten without any ill effects, so that the fish that are at this new place that he has described are certainly not the original ones. And the drum again that he speaks of, I quite understand what that was. They had a similar thing at Aro Chuka in the form of large pots buried in the ground inside the juju cave, and the Aró priest who had to speak put his head down into the pot and mumbled out his words there, so the sound of the voice appeared to come from the ground. With regard to the superstitions of the natives, I remember a very interesting story of a Hausa elephant hunter. He had, of course, an old bundook gun, which was very long but would not have killed an elephant. The method adopted was the poisoned arrow. I asked the hunter, "How do you get that arrow to penetrate into your elephant?" He said, "I go quite near to him." And I said to him, "But aren't you rather afraid of going so near an elephant?" "Oh no," he said, "I am not afraid; I cover myself with my juju and the elephant cannot see me, he does not know I am there;" and the man had absolute faith that the elephant could not see him at all. When a man has that faith there is no bravery in his calling. This paper has been exceedingly interesting to me. The progress is a continuation of what I watched for some twelve years; it will have to go on for a good many years more, but it is a territory which is going to be of great value to this country, and the future of it is one that will be very valuable. I have again to thank Lieut. Steel for his very excellent lecture.

Mr. F. Shelford: The paper that we have heard to-night has been of great interest, and the work that Lieut. Steel has been doing is most useful. A large part of the colony of Southern Nigeria, particularly between the Cross river and the Benué, is still unknown. As far as I can gather, Mr. Steel has explored over 1500 square miles of this district. Of course, I quite understand that mapping is not the only work he has done. The country has been brought under control as well. I would like to say a word in support of the author with regard to the gin trade. I quite agree with him in what he has said. I have frequently been in Africa, and I never yet saw a West African the worse for liquor. When I came home from Africa last year, I did a motor ride on Whit Monday, and I am afraid I cannot say the same for my own countrymen.

It is, I think, fairly well known to the public that the railway from Lagos is proceeding rapidly towards Jebba on the Niger, and at the same time we have headquarters at Jebba and are constructing the railway northwards and southwards from this point. At the same time the High Commissioner of Northern Nigeria is striking a railway from Baro on the Niger towards Zaria and Kano. When this programme is completed the railway system will represent some 800 miles of line. The system really consists of a main line of railway from Lagos to Kano, with a branch line to Baro. It may be a question hereafter, when some goods are at Zungeru, whether it is better to convey them overland or down the Niger; that is a question which will settle itself hereafter. Of course the rate charged upon the Niger may be less than by the railway to Lagos, but the question is whether you can get large quantities of goods down the river expeditiously. My own experience of the Niger was to be stuck on a sandbank for sixteen hours. Almost the whole

of the country between the Benué and the Cross river remains unexplored. It measures, roughly, 150 miles from Oguta to the Benué, and 250 miles from the Niger over to the German boundary, that is an area of 35,000 square miles at least which remains unknown. The only way to develop these countries and open up what is really the darkest part of Africa, is to construct roads, tramways, or railways, and assist the native to get his produce out of the country, and enable him to obtain goods from home.

Mr. E. P. Cotton: I have listened with great pleasure to Lieut. Steel's paper this evening. He has pointed out with remarkable lucidity the difficulties and danger which must be encountered in preparing a pathway for trade and commerce in regions where ignorance and savagery has hitherto prevented the tribes from trading even with their next-door neighbours. What Lieut. Steel has told us happened in the eastern province in 1906 occurred in the western province less than twenty years ago, where at present a contented and prosperous community are prosecuting their various avocations without the slightest fear of molestation; and, inferentially, we may hope that in less than twenty years hence these people of the eastern province may be enjoying the benefits of a large and increasing commerce, and appreciating the blessings of an enlightened government. I had hoped that Lieut. Steel would have had time to say more about the geology of Southern Nigeria, which is structurally composed of gneisses, schists, and granite, on the top of which sediments have deposited. In the coastal districts of the western province large bituminous areas have been discovered, and although bitumen appears to have no commercial value, it nevertheless indicates the presence of petroleum, which I firmly believe will yet be found. We must not, however, expect to find it in the first bore, any more than in auriferous country we should expect to find gold in the first shaft, and much labour and capital may be necessary to locate a positive position by negative evidence. With regard to the Yoruba people and their language, I should like to mention that I discovered recently that they have a deaf and dumb language in which they can converse quite intelligently and with great rapidity. I am not, however, yet able to offer a full explanation of the methods employed.

Mr. Parkinson: I should like to mention the great pleasure I have had to-night in revisiting some old scenes in Southern Nigeria under the guidance of Lieut. Steel, and in hearing his account of many new ones. Two or three points are, I think, especially noteworthy in this paper; and one of them is the establishing of another part of the line of demarcation between the bush country on the south and the more hilly, open country on the north. Lieut. Steel has added very materially to our knowledge of one of the two districts in Southern Nigeria, which were, I think, practically unknown when I was there. The first, the north-eastern corner of the Protectorate, is still but little known, although I understand from Captain Ruxton that in Northern Nigeria the country to the south of the Benué and east of Abinsi has now been mapped. The second is the country between the Niger and the Cross river described to-night. Lieut. Steel showed us an excellent photograph of a round hut. One is inclined to associate the round hut with the Bantu; and Sir Harry Johnston, if my memory serves me correctly, said many years ago, that the people of the upper Cross river were in part Bantu. I was very much struck in the market-places round Abakalliki with the Bantu-like features of many of the natives. Another point I would like to mention is the importance assumed by the river Imo. Of course we all knew the Imo was an important river, but I do not think we all realized its source was as far north as, or farther north than, the latitude of Afigpu. I would like to ask Lieut. Steel if he can give me any information as to the kind of rocks found. The only specimen I have from between the Niger and the

Cross river is part of a limestone nodule from a village somewhere to the east of Oka, which very closely resembles the cretaceous limestones from the district south of the Oban hills. The westerly extension of the cretaceous beds is a matter of great geological importance.

The PRESIDENT: I will now ask you to give a hearty vote of thanks to Lieut. Steel for his valuable lecture.

Lieut. STEEL: Mr. Parkinson asked what is the nature of this country up the Cross river. I am afraid I left it out of my lecture. But it was an extensive series of sandstones and igneous rocks.

SOME SCIENTIFIC RESULTS OF THE ANTARCTIC EXPEDITIONS, 1901–1904.*

By Prof. J. W. GREGORY, F.R.S.

THE collections and observations made by the Antarctic expeditions of 1901 to 1904 are so extensive that the complete results will apparently not be available for another two or three years; but already a sufficient amount has been published to throw much light on many of the problems which the expeditions went forth to solve, and to indicate the answers that may be expected from the complete evidence collected. A brief reference to the various memoirs already published may be of service; but in this notice it is proposed to confine attention to the two British, the German, and the Swedish expeditions, for the earlier voyage of the *Belgica* and the later French expedition under Charcot do not belong to exactly the same campaign. Each of the four national expeditions is publishing its scientific results in a series of large quarto works, which will form, when completed, an Antarctic library of about thirty volumes.

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* 'National Antarctic Expedition, 1901–1904.' Natural History. Vol. 1, Geology (Field-Geology, Petrography); vol. 2, Zoology (Vertebrata, Mollusca, Crustacea); vol. 3, Zoology and Botany (Invertebrata, Marine Algæ, Musci). British Museum (Nat. Hist.), London, 1907. (Vol. 4 not yet issued.)

'Deutsche Südpolar Expedition, 1901–1903.' Edited by E. von Drygalski. Vol. 1, Technik, Geographie, pt. i., 1905; vol. 2, Kartographie, Geologie, pt. i., 1906; vol. 5, Erdmagnetismus, vol. 1, pt. i., 1907; vol. 6, Erdmagnetismus, vol. 2, pt. i., 1906; vol. 7, Bakteriologie, Hygiene, pt. i., 1906; vol. 8, Botanik., pt. i., 1906; vol. 9, Zoologie, pts. i.–v., 1905–1907.

'Scottish National Antarctic Expedition. Report on the Scientific Results of the S.Y. *Scotia* during the Years 1902, 1903, and 1904, under the Leadership of William S. Bruce.' Vol. 2, Physics, pts. i.–iii., 1907; vol. 5, Zoology, pts. i.–xii., 1905–1908.

'Wissenschaftliche Ergebnisse der Schwedischen Südpolar Expedition, 1901–1903 unter Leitung von Dr. Otto Nordenskjöld.' Vol. 1 (Narrative, Geography, Hygiene, etc.), pts. 3 and 4, 1905; vol. 3, Geology, pt. 1, 1905; vol. 4, Botany and Bacteriology, pts. 1–6, 1905–1907; vol. 5, Zoology, pts. 1–9, 1905–1906.

Geological Results.

The full official statements of the geological results are still very incomplete. The general conclusions have been announced in a series of preliminary reports and narratives that deal more particularly with the glacial problems. Only the English expedition has published its final geological report, which has been issued as the first of four volumes on the natural history results of the expedition, published by the British Museum. This volume, prepared under the supervision of Mr. L. Fletcher, consists of two reports, one containing the observations of Mr. H. T. Ferrar on the glacial and stratigraphical geology of the region visited, and the other consisting of a detailed memoir by Dr. G. T. Prior on the rock specimens collected. Mr. Ferrar's report shows that South Victoria Land and the off-lying islands include rocks belonging to four distinct groups. The mainland is built on a foundation of rocks, which have petrographically the characters of the Archean. These rocks are covered by a wide sheet of horizontal sandstones containing traces of plant remains, but no recognizable fossils. The sandstones are cut through by sills of dolerite, and along the coast there are volcanic mountains of geologically recent date. Mr. Ferrar's work is important, as it gives the first definite information about the structure of South Victoria Land. He also describes the glacial features of the country, and represents Ross's Great Ice Barrier as a piedmont-glacier formed by confluent sheets of land-ice. The glacial observations made by the expedition cannot, however, be satisfactorily considered until the meteorological data collected have been published. Dr. C. Rabot, in an interesting paper on the glacial observations of the four expeditions, has remarked the contradictory statements as to the glaciers of South Victoria Land (*La Géographie*, vol. 16, 1907, p. 388). Some of the ice forms, whose nature is doubtful, were also met by the German expedition; and from Prof. von Drygalski, a leading expert on glacial geology, a convincing statement may be expected.

The second memoir in the report of the British expedition is a valuable description by Dr. J. T. Prior of its rock collections. The most interesting are the volcanic rocks of the Ross islands, among which Dr. Prior has identified basalts, kenytes, phonolites, and trachytic phonolites. He points out that these rocks are allied chemically to those ejected by the Atlantic and not by the Pacific volcanoes. The rocks, however, are closely allied to those of the southern end of New Zealand. If, therefore, South Victoria Land is to be regarded as having an Atlantic type of coast structure, so also has the southern province of New Zealand. The structure of South Victoria Land resembles, however, the secondary type of Pacific coasts, though the evidence collected by the expedition is not sufficient to settle conclusively the geographical character of this coast.

The geological work of the German expedition in the *Gauss* also

gives most valuable information as to the structure of part of the mainland of Antarctica. The Kaiser Wilhelm Land, discovered by the expedition, is probably the most westerly known continuation of Wilkes' Land, for Prof. von Drygalski and his companions saw land to the north-east of their winter quarters, not far from the site assigned by Wilkes to Termination Land.

The German expedition was only able to land on one part of the coast, and there it discovered the Gaussberg, a basalt mountain 370 metres high. The Gaussberg is an Upper Cainozoic volcano, probably either late Pliocene or Pleistocene. It is built of leucite-basalt and tuffs, which rest on a platform of plutonic rocks, as is indicated by the occurrence of nodules of granite and gneiss enclosed in the lava. The general structure of the mountain and its glaciation are described by Prof. von Drygalski, its geology by Dr. Phillipi, and Dr. Reinisch has contributed a detailed petrographic account of the rocks. The glacial evidence is geographically important, as the erratics collected show the continental nature of the land to the south.

The geological results of the Scottish expedition will be stated in the third volume of its collected reports, some of which have been already published. Thus, Mr. E. T. Newton has described the Devonian brachiopods collected in the Falkland islands, and gives a series of further illustrations of the variations of *Spirifera antarctica*.

The general distribution of the deep-sea deposits has been described by Dr. Harvey Pirie, and their range illustrated by a map, which fills a large gap in the petrographic chart of the ocean-floor. The geology of Gough island is described by Dr. Pirie, and its rocks by Mr. R. Campbell, who determines them as trachytes and trachydolerites, one of which contains hypersthene. Mr. Campbell identifies the rocks as belonging to the same general series as those of the Azores, Teneriffe, and the other Atlantic volcanic islands.

The geological work of the Swedish expedition has been summarized in a preliminary report by Dr. Gunnar Andersson, of which a review has already appeared in the *Geographical Journal*. The only part of the final geological volume which I have seen is that by Wiman on the early Cainozoic vertebrates of Seymour island; it contains the description of some fossil whales' bones and six new genera of extinct penguins. This discovery is of the greatest geological and geographical interest. The author attributes these species to the Lower Cainozoic, and seems inclined to favour their Eocene age. There has been a tendency to assign the Cainozoic deposits of southern Australasia to an unduly early age, and this influence has perhaps affected the author's opinion as to the age of these fossil birds. We shall, accordingly, await with interest the description of the other fossils obtained by the expedition, to see what light they throw on the precise age of this very important group of fossil penguins.

The National Antarctic Expedition.

Biological Results.

The second and third volumes of the report of the National Antarctic Expedition are devoted to the zoological and botanical results which have had the benefit of the careful, expert editorship of Mr. Jeffrey Bell.

In the second volume the three longest reports are those on the mammals and the birds by Dr. Wilson, and on *Cephalodiscus* by Dr. Ridewood. Of all the reports in these volumes Dr. Wilson's are, no doubt, of the widest popular interest, as they deal with the habits and general natural history of the seals and birds. They are illustrated, moreover, by a series of plates after Dr. Wilson's charming sketches and Lieut. Skelton's artistic photographs. The expedition did not collect any new species of either mammals or birds, but it made the first discovery of a colony of nesting Emperor penguins; it obtained sketches or photographs of an undescribed dolphin in the outer zone of the pack-ice, and of the unnamed whale which had been previously seen by Ross and McCormick. Dr. Wilson's reports include a most interesting sketch of the life of the penguins and of the Weddell seal, of which the expedition obtained thirty-nine skins or skulls, as well as two fœtal specimens and twelve embryos, which are being investigated by Dr. Marrett Tims. Dr. Wilson's report also describes the rarer Ross seal, supplementing the account by Dr. Racovitza published in the reports of the *Belgica* expedition. It was found that the Emperor penguin breeds in mid-winter, and it was impossible then to reach its nesting-ground and thus collect the fresh eggs or early embryos. Dr. Wilson deplores this fact, as he suggests that the Emperor penguin may be "the nearest approach to a primitive form, not only of a penguin, but of a bird." This view, however, receives no support in the next memoir, which is a valuable description by Mr. W. P. Pycraft of various points in the anatomy of the penguins. Mr. Pycraft also gives a useful summary of previous literature on the subject. Mr. Pycraft's most interesting addition to knowledge of the penguins is probably his account of the development of the feathers, based on the study of specimens in the resting plumage. He shows that the old view that the feathers of the penguins are allied to the scales of snakes and thus indicate the primitive nature of the penguin, is without foundation. The feathers, he says, are "unquestionably degenerate," and he refers again later to the "intense specialization which these birds have undergone."

Dr. Ridewood's monograph on *Cephalodiscus*, one of the primitive members of the Chordata, includes the description of probably the most important of the new animals collected by the British expedition. The specimens were recognized as *Cephalodiscus* by Sir Ray Lankester, who

described one species, which is now made the type of a new subgenus, *Idiothecia*. Dr. Ridewood adds a new species, *C. hodgsoni*. His report is a complete monograph on this very interesting genus, once regarded as a member of the Bryozoa; it appears to be most abundant in the Antarctic seas and Southern ocean, though it has been found by the Sibogo expedition, as described by Dr. Harmer, off Korea, Celebes, and Borneo. Dr. Ridewood's detailed research on the material collected by Mr. Hodgson has enabled him to determine the nature of some hitherto doubtful structures in the anatomy of these animals.

The fish collection is described by Mr. Boulenger, and includes ten species, of which four are new; five of the remaining six were previously collected in the same district by the Southern Cross Expedition.

The cephalopods, described by Mr. W. E. Hoyle, are represented by some mandibles found in the stomachs of the seals and the penguins. The rest of the Mollusca are described by Mr. E. A. Smith and Sir Charles Eliot. Mr. Smith describes the ordinary gastropods (twenty six species) and lamellibranchs (fourteen species), of which three-fourths are new; only one of the species had been collected by the *Belgica* on the other side of the Antarctic area, but the one species of Amphineura, a chiton, perhaps the most interesting of the Mollusca, had been previously described from specimens discovered by the German deep-sea expedition (*Valdivia*) off Bouvet island. Mr. E. A. Smith also describes the two brachiopods, both of which are new, though one is only separated doubtfully from a species found on the coasts of Patagonia and Kerguelen.

The pteropods are described by Sir Charles Eliot. Specimens of five species were collected, all belonging to previously known species; their interest lies in their distribution, and Sir Charles Eliot's remarks on their evidence are quoted subsequently. The small series of nudibranchs is divided among twelve species, ten of which are new, while two belong to new genera.

The reports on the Arthropoda are contained in the second and third volumes. Two species of decapods were obtained, and they are identified by Dr. Calman with species previously known from South Georgia. The collection of the Cumacea includes four species, two represented by single specimens. One of the species also lives off Norway, in the Mediterranean, and West Ireland; but Dr. Calman remarks that he attaches very little value to that fact, as the animal has probably a continuous distribution between those areas.

The largest collection of Arthropoda is naturally that of Amphipoda, which are described by Mr. A. O. Walker. It includes fifty-three species, of which eighteen are new. Some of the species have a wide range, as they occur also in British, Arctic, and tropical seas. The amphipods include two anomalous and rare forms, and Mr. Walker

remarks the fact that the four species of *Iphimedias* are much larger than the Arctic species of that genus.

Dr. Joseph Thiele describes the Leptostraca, one species of *Nebalia* that was found in MacMurdo bay by Mr. Hodgson. It was previously known from the Straits of Magellan, and was also collected by the German Antarctic Expedition at its winter quarters.

Prof. G. S. Brady describes the Ostrocoda, of which nine species were found, including seven new ones, and Prof. Gruvel the four species of Cirripedia, two of which are new. Dr. E. L. Trouessart describes the two specimens of Acari, both found in Granite harbour; they belong to an Antarctic variety of an Arctic species, *Leptopathis alberti*, named after the Prince of Monaco.

The longest report in the third volume is that by Mr. Hodgson on the Pycnogonida, of which the expedition obtained what, for this group, was the remarkably large collection of twenty-eight species, including three new genera. Mr. Hodgson was delighted at his discovery of a new species, *Pentanymphon antarcticum*, which has ten legs instead of eight, the usual number in this group; he thus re-established the accuracy of Eight's description, seventy years ago, of a ten-legged pycnogonid from the South Shetlands.

The worms described in these volumes include three species of tape-worms, of which two are new; they were all found in the stomach of Ross's seal, and are described by Mr. A. E. Shipley. Dr. von Linstow describes the one nematod, a new species, interesting as the largest known free-living member of its order. Dr. G. H. Fowler describes the collection of that small pelagic worm, *Sagitta* (Chætognatha), of which the expedition obtained three species; and he takes the opportunity of revising the Antarctic and sub-Antarctic *Sagittæ* collected by the *Challenger*. The three species obtained by the *Discovery* were previously known, but they have extended the range of this cosmopolitan worm southward as far as the winter quarters of the expedition.

Two reports have been issued on the Cœlenterata; the first, by Prof. Hickson, describes the Alcyonaria, which are divided into eight species, of which three are new. The collection, Prof. Hickson remarks, has "not perhaps many very remarkable features," though one species helps to connect the genera *Primnoella* and *Caligorgia*.

The hydroids, however, are described in the joint report by Prof. Hickson and Mr. Gravely as "remarkably rich and interesting." The collection was nearly all obtained from the winter quarters, and represents a practically sub-glacial fauna. It included twenty-five species, of which eleven are new. The hydroid found at the greatest depth, 130 fathoms, and named *Tubularia hodgsoni*, is described as a "remarkably interesting species." The Cœlenterata are also represented by a puzzling structure, which Mr. Hodgson nicknamed the "boot-lace," and was recognized by Prof. Bell as a tentacle of some

hydrozoon. A note by Dr. John Rennie, who had previously met with similar specimens in the collection of the Scottish Antarctic Expedition, gives a technical description, and shows that they are fragments of the tentacles of one of the Siphonophora. Fortunately, the Scottish expedition obtained sufficient of this animal to enable Dr. Rennie to show (*Proc. R. Phys. Soc. Edin.*, vol. 16, part 1, pp. 25–27, plate xvi.) that it probably belongs to the genus *Apolemia*, previously known in the Mediterranean.

The sponges are being monographed by Mr. Kirkpatrick, and appear to be one of the most important parts of the collections. There are no horny sponges, but rich series of both siliceous and calcareous sponges. The only group so far described is that of the Hexactinellida, which is represented by ten species, of which eight are new. They include the types of three new genera. This is a valuable addition to the Antarctic siliceous sponges, of which only one was known until the expeditions of the *Belgica* added nine species.

The botanical results of the National Antarctic Expedition are stated in two reports on marine algæ and one on mosses. The mosses are described by M. Cardot, whose report includes a list of fifty-one species known from the Antarctic regions. The expedition collected seven species, of which two are new, and as these mosses were found on Granite harbour and the islands around McMurdo sound, they are interesting as the most southern known land plants. M. Foslie describes a new species of calcareous algæ, an incrusting lithothamnion, found at Coulman island. The other marine algæ are described in an interesting report by Mr. and Mrs. Gepp. The number of species (twelve) is small, but some are interesting novelties, and the report upon them contains some suggestive remarks as to the abnormal conditions under which these plants have grown, and states problems for investigation by future Antarctic biologists. Mr. and Mrs. Gepp's report includes a further addition to the new algæ they had previously described from the South Orkneys, brought back by the Scottish Antarctic Expedition.

Many of the contributors to the two volumes remark on the smallness of the collections. The general regret that it was not possible to afford greater opportunities for the use of the equipment at sea is increased by the ample fresh evidence afforded by the expedition of the extreme richness of the Antarctic fauna. How varied it is may be illustrated by the nudibranchs, of which sixteen specimens were collected by the expedition. Sir Charles Eliot assigns five of these to one species, and each of the remaining eleven specimens represents a distinct species, of which nine are new. Mr. Hodgson, in his very interesting introduction to the third volume, remarks that in McMurdo sound "the fauna was extremely rich," and therefore naturally deplores the few opportunities he had of collecting, except at that one locality.

The general regret expressed in these volumes at the smallness of the collections is joined with warm appreciation of the resourceful ingenuity and untiring energy with which Mr. Hodgson used every available opportunity. Thus Professor Hickson and Mr. Gravely express their admiration and appreciation of his services to science, describing them as proof of "extraordinary skill and enthusiasm in the cause of zoology."

The German Expedition.

General Reports.

The scientific results of the German expedition have the advantage of issue in one complete work of ten volumes, instead of being scattered amongst various publications. Ten parts have been received up to date, but as several of these are preliminary descriptions of the methods of equipment, it is not yet possible to estimate the full results. The work has been prepared with characteristic German thoroughness. The first part is devoted to a detailed account of the *Gauss* and its technical and scientific equipment, by the chief engineer, A. Stehr. His report is illustrated with a series of thirteen valuable plates. Two volumes (5 and 6) are assigned to terrestrial magnetism, and one part of each has been published, but they both deal with the apparatus and methods employed, and not with results. Dr. Bidlinmaier begins the fifth volume with a memoir on the double compass, and traces its development from its suggestion by Captain Walker. He maintains that the results given by the instrument during the expedition show its suitability for such work. Herr K. Luyken, in the first part of the sixth volume, describes the magnetic observatory established on Kerguelen.

One part has been issued of the volume (No. 8), on bacteriology and hygiene, and consists of a report by Dr. Gazert, the medical officer of the expedition, on the food used, and on the methods by which it was tested, packed, and stored. He gives a full list of the provisions used, with notes as to their success and popularity. The daily rations of each are stated in grammes. He discusses the value of alcohol, with the conclusion that its use should be avoided during journeys, but that a little in winter quarters or on board ship is harmless.

Biological Results.

Turning to the biological work of the expedition, sufficient has been published to show the high importance of its collections, which appear to be so large that there has not yet been time to work out any of the larger zoological groups or marine algæ.

The botanical results are given in the eighth volume, of which six

parts have been issued. They deal with the land plants, and nothing has yet been published dealing with the marine flora. The collections of land plants were made mainly on the sub-Antarctic islands, and the most interesting material, in reference to Antarctic problems, is from Kerguelen and from Possession island, one of the Crozet group.

The fungi are described by Prof. P. Hennings. His report raises the list of species known from Kerguelen and Possession island from eleven to forty-three, of which thirty-seven are new.

The liver mosses are described by Prof. Victor Schiffner, and are mainly from Kerguelen, from which he records thirty-seven species, of which three are new. This flora includes sixteen endemic species; of the remainder, two are cosmopolitan, and the rest show that the liver mosses are more closely allied to those of the Magellanic region, with which it has fourteen species in common, than to those of Australia or New Zealand, with which it has only six species in common.

The lichens have been investigated by Dr. Alex Zahlbruckner, and in addition to a large flora containing many new species from Kerguelen, he records three species, of which two are new, from the Crozet group, and two from Heard island. The most interesting discovery is, however, that of three species from the Antarctic mainland at the Gaussberg, the winter quarters of the expedition on Kaiser Wilhelm II. Land in western Wilkes Land; they are the first known lichens from the mainland of Antarctica.

The mosses are described by Dr. V. F. Brotherus, who deals with a flora of sixty-one species, of which thirteen are new. Most of them were collected at Kerguelen, the Crozet islands, or Heard island; but some, including a new species (*Bryum filicaule*), were found on the mainland of Antarctica, at the Gaussberg.

The vascular plants collected on the sub-Antarctic islands are described by Prof. H. Schenk. The collection includes no new species; but the material obtained on the Crozet island is of interest, as proving that that archipelago is occupied by the Kerguelen flora. The last of the botanical reports yet published is that by Dr. Emil Werth on the vegetation of the sub-Antarctic islands. It is illustrated by eleven fine plates and numerous photographs; it describes the general character and aspect of the vegetation, and discusses the problems of its special growth and environment.

The zoological results of the expedition are to be given in the ninth and tenth volumes, of which I have only seen four parts. They are enough to show the great value of the collections, though naturally the reports first ready deal with the smaller groups, so that the general bearing of the results on biological geography cannot yet be considered. The first memoir is by Dr. W. Michaelsen, of Hamburg,

on the Oligochæta, of which the expedition obtained seven new species. The section of this report of most general interest is the author's discussion of the bearings of the collection on the former history of Antarctica, and its past relations to the sub-Antarctic regions. Several new species of Notodrilus, a worm with a very interesting distribution, were discovered on the Crozet islands, and Dr. Michaelsen has been induced by this new evidence to change his views as to the former geographical conditions of the sub-Antarctic lands. He had hitherto regarded the hypothesis, that the distribution of the worms showed that the sub-Antarctic lands were once much larger, and their southern points connected to an Antarctic continent, as unnecessary. After an interesting discussion on this subject, and of Prof. Benham's well-known address, he concludes that, though the distribution of the Oligochæta may not absolutely require the once greater size of the Antarctic continent, it is very difficult otherwise to explain the facts (p. 55).

The Leptostraca are described by Herr J. Thiele. The collection consisted of fifteen specimens of a new species and a *Nebalia longicornis, magellanica*, both of which were found at the winter quarters of the expedition near the Gaussberg.

The marine Acari are described by H. Lohmann, of Kiel. The collection is very rich, and the report on it is illustrated by sixteen plates. The expedition obtained no less than six hundred specimens off the coast of Wilkes Land, and they are distributed amongst twenty-nine species, of which twenty-two are new. The report describes one new genus (*Werthella*), and gives a chart of the world showing the distribution of the species. The author concludes (p. 365) that two striking results of his study of the affinities of the Antarctic Halacarids are that they are nearly allied to those of warm seas, and have an intimate relationship to those of the greater oceanic depths in the northern hemisphere.

Among the additions to the fauna of the sub-Antarctic islands is the report by G. Budde-Lund, of Copenhagen, on the land isopods, based on a collection of thirteen species, of which three are new. One of the new species was found during the visit of the expedition to Simon's Town.

The Pteropoda obtained by the *Gauss* are described by J. Meisenheimer, of Marburg, who has obviously had to handle an enormous collection. It has yielded two new species and several new varieties. Pteropods were collected at seventy-four stations, and the total number of specimens obtained must have been very large. At one station, for example, twenty-one species were represented by 119 specimens, in addition to three species, of which the numbers are recorded as "numerous" or "very numerous." Much of the material was obtained in the Atlantic and off the Cape during the voyage, but a fine series

was obtained off the coast of western Wilkes Land, near the winter quarters. The distribution of the pteropods is illustrated on a chart of the world. The author of this report discusses bipolarity in reference to three species that are common to both polar seas, and he reaffirms his previous conviction that the pteropods developed first in tropical seas, whence they spread to the poles. The disappearance from the tropics of species that still live in the colder northern and southern waters has given them their present discontinuous distribution.

Another pelagic group well represented in the *Gauss* collections is that of the salps, described by Dr. C. Apstein, of Kiel. He has taken the opportunity of issuing a complete monograph of the genus, including a systematic synopsis of all the species and their distribution. Two species were collected off the Gaussberg.

A microscopic fauna has been isolated from the mosses of the Gaussberg and of some of the southern islands, and described by Prof. F. Richters. The fauna with which he deals comes from seven localities; the most southern was the Gaussberg, from which he records two protozoa (an *Amœba* and a *Corycia*), four rotifers, and a tardigrade. Prof. Richters, in his interesting summary of the conditions under which this southern moss fauna lived, expresses his surprise that, in spite of his careful examination of the sods of *Bryum* from the Gaussberg, so small a protozoon fauna was obtained. He thinks the paucity of the results cannot be explained as due to failure in observation. From the sub-Antarctic islands the microscopic fauna was naturally much larger, and includes many new species. From the Crozet islands Prof. Richters records eighteen Acari, including eleven new species and three new genera; and in mosses from the same locality he obtained five species of insects, including a new genus, and six species of water-bears, some of which are known from Arctic regions. Ten species of water-bears were also found in Kerguelen. These animals are so ubiquitous that their distribution is of little significance.

The sponges appear to be among the commonest animals found on the Antarctic shores, but so far, of the German collections, only the Tetraxonia have been described. The memoir on this group of sponges is by Dr. R. von Lendenfeldt, who has divided the 267 specimens collected at the winter quarters of the expedition amongst six species; one new species belongs to a genus *Tribrachion*, previously only known from the West Indies, and two of the species (*Plakina trelopha* and *P. monolopha*) live also in the Mediterranean. The memoir includes a long detailed description of the species, and Dr. von Lendenfeldt remarks that they present no unusual structural features.

The Protozoan collection, on the other hand, has yielded some remarkably interesting new forms, most of which have been described by Dr. O. Schröder, of Heidelberg. In one memoir he describes four

species of Infusoria; in another a new rhizopod, representing a new genus of Foraminifera, Echinogromia, dredged from the depth of 380 metres. A third memoir, by Dr. Schröder, describes a new genus of Radiolaria, *Cytocladus*, referred to a new family, the Cytocladidæ. The animal is of interest from its comparatively colossal size of 14 mm. in diameter. As there is no available evidence about the life-history of the animal, the author is doubtful whether a new group should not be established for it, intermediate between the Radiolaria and the Heliozoa. Another unusually interesting new discovery is that of a stalked Radiolarian, from the northern coast of Wilkes Land; the author names it *Podactinellus*, and it is illustrated by two coloured plates. This interesting genus is also the subject of a memoir by the *doyen* of German protozoologists, Prof. O. Butschli, who proves that the spines of *Podactinellus* consist of strontium sulphate. This somewhat startling fact is demonstrated by the use of those refined methods of microscopic chemistry of which Butschli is such an acknowledged master. The author remarks that he has no knowledge of strontium having been previously found in animal skeletons, and refers to detailed analyses that he had previously made of the calcareous skeletons of many marine organisms, by which the absence from them of strontium had been clearly shown.

The Scottish Expedition.

The scientific results obtained by the Scottish expedition under Dr. Bruce in the *Scotia* have been partly issued in a series of papers, which already number fifty-six, scattered through various scientific serials, including the *Philosophical Transactions*, the *Transactions and Proceedings of the Royal Society of Edinburgh*, the *Proceedings of the Royal Physical Society of Edinburgh*, the *Scottish Geographical Magazine*, and the *Ibis*. The following list, which omits numerous preliminary and general papers on the expedition, and those that are being reprinted as vol. 5 of the expedition reports, may therefore be useful:—

'Report of the Scientific Results of the Voyage of the S.Y. *Scotia* during the Year 1902, 1903, and 1904.' Vol. 2, Physics. 1908. Pt. i. R. C. Mossman, Meteorology; pt. ii. Charles Chree and R. C. Mossman, Magnetism; pt. iii. G. H. Darwin, Tides.

J. H. Harvey Pirie and R. Campbell, "Notes on the Geology and Petrology of Gough Island." *Proc. R. Phys. Soc. Edinb.*, vol. 16, No. 6, 1906, pp. 258–266.

J. H. Harvey Pirie, "On the Graptolite-bearing Rocks of the South Orkneys." *Proc. R. Soc. Edinb.*, vol. 25, pt. 6, 1905, pp. 463–470.

E. T. Newton, "Some Falkland Island Fossils." *Proc. R. Phys. Soc. Edinb.*, vol. 16, pt. 6, 1906, pp. 248–257, pl. x.

W. E. Clarke, "On the Birds of Gough Island, South Atlantic Ocean." *Ibis*, vol. 5, 1905, pp. 247–268, pl. vi.

W. E. Clarke, "Ornithological Results of the Scottish National Antarctic Expedition. On the Birds of the South Orkney Islands." *Ibis*, vol. **6**, 1906, pp. 145–187, pl. iii.–xiii.

W. E. Clarke, "On the Birds of the Weddell and Adjacent Seas, Antarctic Ocean." *Ibis*, vol. **7**, 1907, pp. 325–349, pl. vii.

L. Dollo, "Bathydraco scotiæ, Poisson abyssal nouveau recuelli par l'Expédition Antarctique Nationale Ecossaise." *Proc. R. Soc. Edinb.*, vol. **26**, 1906, pp. 65–75.

L. Dollo, "Neobythites brucei. Poisson abyssal nouveau recuelli par l'Expédition Antarctique Nationale Ecossaise." *Proc. R. Soc. Edinb.*, vol. **26**, 1906, pp. 172–181.

L. Dollo, "Notolepis coatsi. Poisson pelagique nouveau recueilli par l'Expédition Antarctique Nationale Ecossaise." *Proc. R. Soc. Edinb.*, vol. **28**, 1907, pp. 58–64.

L. Dollo, "Prymnothonus hookeri, Poisson pelagique de l'Erebus et de la *Terror* retrouvé par l'Expédition Antarctique Nationale Ecossaise." *Proc. R. Soc. Edinb.*, vol. **27**, 1907, pp. 35–45.

T. V. Hodgson, "On Decalopoda australis, Eights: an old Pycnogonid rediscovered." *Proc. R. Phys. Soc. Edinb.*, vol. **16**, pt. 1, 1905, pp. 35–42, pl. iii., iv.

Prof. J. A. Thomson, "Note on the Gonostyles of two Antarctic Siphonophora." *Proc. R. Phys. Soc. Edinb.*, vol. **16**, 1904, pp. 19–22, pl. i.

John Rennie, "On the Tentacles of an Antarctic Siphonophora." *Proc. R. Phys. Soc. Edinb.*, vol. **16**, 1905, pp. 25–27, pl. ii.

J. A. Thomson and J. D. Fiddes, "Note on a Rare Sponge from the *Scotia* Collections." *Proc. R. Phys. Soc. Edinb.*, vol. **16**, pt. 6, 1906, pp. 231–232.

James Murray, "Note on Microscopic Life in Gough Island." *Proc. R. Soc. Edinb.*, vol. **27**, No. 4, 1908, pp. 127–129.

A. and E. S. Gepp, "*Scotia* Collections: Algæ." 1, Antarctic Algæ. *Journ. Bot.*, vol. **43**, 1905, pp. 105–109, pl. 470.

"Atlantic Algæ of the *Scotia*." *Ibid.*, pp. 109–110.

"More Antarctic Algæ." *Ibid.*, pp. 193–196, pl. 472.

E. N. Holmes, "Some South Orkney Algæ." *Journ. Bot.*, vol. **43**, 1905, pp. 196–198.

A. and E. S. Gepp, "A New Species of *Lessonia*." *Journ. Bot.*, vol. **44**, 1906, pp. 425–426.

R. N. Rudmose Brown, "The Botany of Gough Island." I. Phanerogams and Ferns. *Journ. Linn. Soc., Botany*, vol. **37**, 1905, pp. 238–250, pl. 7–9.

R. N. Rudmose Brown, C. H. Wright, and O. V. Darbishire, "The Botany of Gough Island." II. Cryptogams, excluding Ferns and Unicellular Algæ. *Journ. Linn. Soc., Botany*, vol. **37**, 1905, pp. 263–267.

R. N. Rudmose Brown, C. H. Wright, and O. V. Darbishire, "The Botany of the South Orkneys." *Trans. and Proc. Bot. Soc. Edinb.*, vol. **23**, 1905, pp. 101–110, pl. iii.

These papers are being reprinted, with much new material, in a work entitled "Scottish National Antarctic Expedition: Report on the Scientific Results of the Voyage of S.Y. *Scotia*,' which will apparently consist of from six to eight quarto volumes. Vol. 2 has been subdivided into two volumes, of which the first has been issued. Others are promised in quick succession.

The first volume will contain the narrative and log; the second is devoted to meteorology and physics; the third, to botany, geology, and cartography; and the zoological results will occupy the remaining volumes.

The only volume yet complete is that issued as the first part of vol. 2, and deals with the meteorology, magnetism, and tides. It is mostly occupied by the meteorological results. The meteorological staff of the expedition was exceptionally experienced. Mr. R. C. Mossman, the chief meteorologist, had been for fourteen years in charge of the principal meteorological station in Edinburgh, and had acted as interim superintendent of the Ben Nevis Observatory. He is already well known from his memoirs on Scottish meteorology, and he was assisted by two other trained meteorologists, Mr. Bruce and Mr. Wilton. The record of the meteorological observations occupy 306 pages, and are illustrated by eleven plates and maps. The meteorological observations are printed at length, and their general bearings are discussed in a series of interesting summaries by Mr. Mossman, who suggests the probable position of the coast of Antarctica, in districts where it has not yet been reached, from the position of the cyclonic centres. He concludes there must be land to the west of Graham Land, as the area near it, south of 64°, is apparently under the influence of the South Polar anticyclone. The power of the cyclones that cross the South Orkneys may be illustrated by Mr. Mossman's statement that, owing to their influence, the nights in the winter were often warmer than the days.

The rest of this volume is occupied by two short reports, giving the result of the magnetic and tidal observations. Both of these have been already published in the *Philosophical Transactions*, and are to be issued in the volume dealing with the physical work of the *Discovery*. The report of the magnetic observations is by Dr. Chree, while Sir George Darwin discusses the tidal observations. The value of the tidal constants have been worked out by Messrs. Selby and Hunter of the National Physical Laboratory, who remark that the observations appear to have been taken with great care. Sir George Darwin explains that the tidal results are quite normal, and that the diurnal tides are almost exactly in the phase indicated by the equilibrium theory. He remarks that the results are very valuable as relating to the only ocean uninterrupted by land throughout the whole circumference of the globe; and their normal character is an interesting contrast to those observed by the *Discovery* in McMurdo sound, which, according to Sir George Darwin, are very abnormal.

Biological Results.

The zoological reports will be collected in three volumes, of which vol. 4 will deal with the vertebrates and tunicates.

The reports on the birds have been prepared by Mr. Eagle Clarke, of the Royal Scottish Museum, and already published in the *Ibis*. He describes some of the results as of firstrate ornithological importance. The collections include two new species of buntings, discovered on Gough island. The second report describes the birds of the South Orkneys, and is illustrated by eleven plates, including coloured drawings of the young of various species, and photographs of penguins when courting, nesting, and feeding their young. Mr. Eagle Clarke has incorporated in this report the careful observations made by members of the expedition, including records of the temperatures of the birds. In addition to its new species of birds, the expedition was fortunate in the first discovery of the eggs and nesting-places of the Cape petrel or Cape pigeon, one of the most familiar birds of the southern seas. The birds of the Weddell sea and of Coats Land, from the collections and observations made during cruises in 1903–1904, are described in Mr. Eagle Clarke's third report (*Ibis*, April, 1905). Seventy-four specimens were collected in the Weddell sea, and they added four birds to the nine which, according to Howard Saunders, alone were previously known from south of the Antarctic circle. The collections add greatly to the range of various species; the "Cape pigeon," for example, was found as far south as 71° 50′, and petrels were seen far to the south of their breeding-places. One very remarkable instance of bird distribution was the discovery of the Arctic tern as far south as 74° 1′ S. No tern was found on the shore at the winter quarters of the expedition, and the South American tern was apparently confined to much lower latitudes; but the Arctic tern, during the northern winter, visits the Antarctic regions, and thus has the greatest recorded range in latitude of any known bird (82° N. to 74° S.).

The fishes are to be described by Dr. Dollo, who has already issued a description of a few special forms, including the abyssal fish *Neobythis*, the affinities of which have given rise to considerable difference of opinion, and are carefully discussed by Dr. Dollo.

The fifth volume consists of the first series of memoirs on the invertebrates, and is complete except for the report on the Medusæ. Most of the volume has already appeared in the *Transactions* of the Royal Society of Edinburgh.

The mollusca are described by Messrs. Melville and Standen, who record ninety-four Antarctic species of gastropods, scaphopods, and lammellibranchs, of which twenty-one are new. One interesting dredge haul yielded about twenty specimens of *Guivillea alabastrina*, hitherto known only by the one specimen collected by the *Challenger* in nearly the same locality. Sir Charles Eliot describes the nudibranchs. The fauna consists of six species, of which four are new, and they include two new genera, that Sir Charles Eliot describes as "very interesting." One of them—*Notacolida*—is the type of a new family.

The reports in this volume on the arthropods includes that by Mr. Hodgson on the Pycnogonida. He describes the collection as "a large one and extremely interesting, totally different from that made by the *Discovery* in the same region, but on the opposite side of the world. If smaller in the number of species brought home, in number of individuals it far exceeds that collection." The most important contribution made by the *Scotia* to the knowledge of the pycnogonids was the rediscovery of *Decalopoda australis*, which had been described by Eights about 1836, and has hitherto, Mr. Hodgson says, "been either forgotten or despised as a monstrosity or as a sample of defective work." Hodgson has previously discussed this form in a paper published by the Royal Physical Society of Edinburgh, in which he maintains the validity of Eights' name and the accuracy of his description. The *Scotia* also obtained a specimen of the *Pentanymphon antarcticum*, the second ten-legged pycnogonid, which Mr. Hodgson discovered in the Ross sea, and he records as found also by the French and German expeditions. In discussing the distribution of the pycnogonids, Mr. Hodgson suggests the division of the Antarctic and sub-Antarctic regions into three provinces—the Magellanic, Australasian, and Kerguelen—and that number certainly seems more natural for Antarctica than a subdivision into quadrants.

Two interesting reports on the land arthropods are contributed by Prof. G. H. Carpenter and Mr. James Murray, dealing respectively with the Collembola and Tardigrada. Prof. Carpenter's report includes descriptions of two new species and one new variety of an old species, and an interesting discussion of the geographical affinities of the fauna. He argues that the distribution of these wingless land insects indicates that Antarctica must once have been much larger, and formerly connected with other lands. He says (p. 57), "There can be no doubt that the trend of modern speculation is against the doctrine of the permanence through past ages of the great ocean basins of the present day." He seems disposed to agree with Ortmann that the last connection with Antarctica existed in the Cretaceous or the Eocene, and that the Collembola found in the South Orkneys and Dancoland, with the presence of *Isotoma* on Kerguelen, indicate the former existence of a great land to the south of South America and connected to Kerguelen either by Antarctica or South Africa. He explains the present distribution of *Cryptopygus* and *Isotoma octo-oculata* as due to their survival throughout the Cainozoic. Another *Isotoma* (*I. brucei*) is of interest, as, though a new species, it is very nearly allied to the Arctic species *I. beselsi*, which has also been recently found in Tierra del Fuego. Prof. Carpenter holds that this species must have migrated from the one polar region to the other through America.

The water-bears are described by Mr. James Murray, and were found in the mosses from the South Orkneys; they include fifteen

species, of which three are new. Mr. James Murray has also added to the sub-Antarctic fauna of Gough island, by the description of the microscopic life found in the mosses of Gough island, in a paper, *Proc. R. Phys. Soc. Edin.*, vol. 17, No. 4, 1908. He discovered in washings from the mosses an egg and two recognizable species of rotifers, which are widely distributed. He also found three species of rhizopods and two of worms.

The parasitic worms are described in this volume; they include a new species of *Echinorhynchus*, founded on sixty specimens obtained from the Weddell seal. The same seal has yielded two new nematods described by Dr. von Linstow. Of the free-living worms, Dr. J. F. Gemmill and Dr. R. T. Leiper describe two new species of Turbellaria from the South Orkneys.

The Cœlenterata are dealt with in three reports. The first is on the Alcyonaria, by Prof. J. A. Thomson and Mr. James Ritchie, who describe nine species, of which six are new. One of the previously known species, *Umbellula durissima*, was represented in the collection by twenty specimens, though it was previously only known from a young one collected by the *Challenger* in the North Pacific. The Hydroidea are naturally more abundant than the Alcyonaria; they include twenty-seven species, of which seven are new. One new genus, *Brucella*, is described by Mr. J. Ritchie as belonging to a rare and interesting type. The third report on the Cœlenterata is that on the Antipatharia by Prof. J. A. Thomson; three species were found, all belonging to the genus *Bathypathes* and including one new species.

The fifth volume also includes Prof. R. Koehler's important memoir (116 pages, 16 plates), on the valuable collection of Antarctic echinoderms made by the *Scotia*. The fauna well shows the remarkable richness of the Antarctic seas. It includes thirty-five species of starfish, of which twenty are abyssal, and of these seventeen are new species, and there are two new genera, *Marcellaster* and *Scotiaster*. Thirteen of the abyssal Antarctic species were dredged between 62° and 71° S. The littoral starfish number fifteen species, of which three are new. Of the ophiuroids there are thirty-one species, of which sixteen are new, and twelve were found south of 62° and five south of 71°. The shallow-water members of this group are represented by twelve species, of which three are new. The sea-urchins (*Echinoidea*) are scarcer. The collection consists of twelve species; four are abyssal and Antarctic, and of these two species and one genus (*Delopatagus*) are new. There are also six littoral species, of which one is new.

The botanical results of the expedition include several preliminary descriptions of the vegetation of the sub-Antarctic islands. The systematic memoirs hitherto issued include only the three papers by Mr. and Mrs. Gepp, of which the first, dealing with the Antarctic algæ collected by the *Scotia* (*Journ. Bot.*, vol. 43, 1905, pp. 105–109, pl. 470),

describes twelve species, of which five are new and one is a new genus, *Leptosarca*. Two of the species were also collected by the *Discovery* in the Ross sea, and of the others, one species was found also in South Georgia and the others in the Falklands and Cape Horn.

The Swedish Expedition.

The reports of the Swedish Antarctic Expedition are to be issued in seven volumes. The advertised price of the series is £15. The first column will deal with the narrative of the journey, the geography, cartography, hydrography, terrestrial magnetism, and hygiene; the second volume with the meteorology: the third with the geology and palæontology; the fourth with botany and bacteriology; and the last three with zoology. The reports are mainly in German.

Two parts (Nos. 3 and 4) of the first volume have been received, and consist of a report on the hygiene of the expedition by the medical officer, Dr. Ekelöf, and on diseases due to preserved food ("Ueber Präserven-Krankheiten"). In his first report he gives a full account of the health of the staff of the expedition, their weight curves, and of the food used. He discusses the question of scurvy, and in his two reports supports Nansen's view that it is due to the use of preserved meats. Dr. Ekelöf holds that all polar expeditions which have not used preserved meats have been free from scurvy. His explanation is that, though the treatment of preserved meats prevents normal fermentation, it cannot stop an analogous process of slow chemical decomposition, which is accelerated when the meat is stored in a warm place. The process gives rise to products similar to those due to fermentation. He thinks this autolytic change in preserved meats is not indicated by any properties that can be recognized by the senses. Hence its great danger. The author's practical suggestions are that in polar work all preserved meats should be prepared immediately before the start of the expedition, in order to limit as far as possible the development of these poisons. Further, that the preserved meats should only be taken as reserve foods, and that during the summer any party that has to winter in polar regions should collect adequate stores of fresh meat for use in the winter. This meat should not be salted, but should be hung up in a dry, cold, shady place or buried in snow. Dr. Ekelöf supports his conclusion by reference to the evidence that beri-beri is also a disease due to poison developed in foods by autolytic processes.

Of the zoological results, nine parts have been issued of vol. 5. It begins with a description by Dr. K. A. Andersson, the zoologist of the expedition, of the marsupial protection of the young in the "Feather-star," *Antedon hirsuta*; this method is adopted by occasional echinoderms, but is of no special Antarctic interest.

The second memoir includes Dr. K. A. Andersson's account of the

mammals and birds, and it is illustrated by a series of excellent photographic pictures of the life and habits of the seals and penguins, and by two maps showing the distribution of the breeding-places of the birds.

A list of the birds collected by the expedition is given in a systematic catalogue by Lönnberg (Part V.); and the same author contributes to this volume a valuable memoir on the fish obtained by the expedition. The richness of this collection is especially remarkable considering that a large part of it was lost with the *Antarctica*. The author objects to Dr. Dollo's limitation of the Antarctic fauna to the region within the Antarctic circle. Lönnberg maintains that any southern sea, where, as in Branfield strait, the temperature in the summer, even to the depth of 1450 metres, is all below 0° C., deserves to be termed Antarctic. As such are the temperature conditions of Branfield strait, which Dr. Gunnar Andersson describes as "the coldest marine area on the globe," the author seems certainly justified in including that district zoologically in the Antarctic.

The fish collection made by the expedition is divided geographically by Dr. Lönnberg into four faunas: the first is that of the Tierra del Fuego region, and is represented by twelve species, including one new species of *Notothenia;* the second fauna is that from the Falkland island and Burdwood bank, where the expedition obtained fourteen species, of which two are new and two are represented by new varieties. The third division includes the fish of South Georgia, whence the expedition brought back thirteen species, making up its fish fauna to eighteen species, of which nine are endemic and four more are represented by new subspecies; the additions to the South Georgian fishes made by the expedition include four new species, for one of which the author establishes a new genus, *Artedidraco*. Two of the species obtained near South Georgia were collected by the *Southern Cross* in the Ross sea, but they are represented by special varieties. The last fauna, that of the Antarctic seas, is represented in the Swedish collections by seven species, of which two are new and two are new varieties; three of them had been obtained by the *Southern Cross* off Victoria Land. The last chapter of this memoir is devoted to various pelagic fish collected during the voyage. The expedition obtained six new species, but only one of them was from high southern latitudes. In addition to the systematic descriptions, Lönnberg gives an account of the propagation of that characteristically Antarctic family, the Nototheniдæ, a contribution to what the author describes as the hitherto unknown life-history of the Antarctic and sub-Antarctic shore-fish.

Of the contributions of the expedition to invertebrate Antarctic zoology, four parts have been issued in addition to one on some Decapoda from Tierra del Fuego and the Falkland islands. Prof. Michaelsen (Part III.) has described the Oligochæta, including two new species from

the Falkland islands and one species, *Phreodrilus crozetensis*, from South Georgia, a species which the author had previously founded upon specimens collected by the *Gauss*.

The Cladocera and Copepoda are described by Dr. Ekman, who divides the fauna into two groups, one including the three sub-Antarctic localities, Tierra del Fuego, the Falkland islands, and South Georgia, and the other the truly Antarctic locality of Graham Land. The collection includes twenty species, of which five are new, and one is made the type of a new genus, *Gigantella*. Several of the species are cosmopolitan, and some are known from Northern Europe and Greenland. Hence, as usual, the evidence of these small crustacea is not very instructive on problems of geographical distribution; the author states the available facts as to the relations of the species collected to those of South America and Australasia.

Among the higher crustacea, the Anomura and Brachyura are described by Lagerberg, but the sixteen species included in his report were all from the Falkland islands or Tierra del Fuego.

The hydroids are described in an elaborate and beautifully illustrated memoir by Dr. Jäderholm, who now supplies full information, supplementing a preliminary account in which he described sixteen new species. In the official memoir he describes three more new species, making a total of fifty species collected by the expedition. Thirteen species, and one only doubtfully identified, came from the Antarctic seas; but some of the Antarctic hydroids also live in Arctic and North European seas, but as so many hydroids are cosmopolitan, their distribution is of comparatively little significance.

The last part issued of the fifth volume is an account by Dr. Wahlgren on the Collembola. Of these insects the expedition collected forty-four new species, of which eleven are new and one is a new genus. Four of the species came from Graham Land, and the rest from Tierra del Fuego and the sub-Antarctic islands.

Of the botanical memoirs on the work of the Swedish expedition six parts have already been issued. The first, by Stephani of Leipzig, is a short catalogue of the liverworts, including seventy-eight species, of which five are new. He divides them into five floras, of which the two smallest are those found on Antarctica (four species) and on South Georgia (sixteen species). Only one of the truly Antarctic species is new, and that was collected also on the South Shetlands.

The remaining parts of this volume are by the botanist of the expedition, Dr. Carl Skottsberg. Parts Nos. 2 and 4 deal with the flora of Tierra del Fuego, and are therefore only indirectly connected with the Antarctic. Part No. 3 is a memoir by Dr. Skottsberg on the vascular plants of South Georgia, and is interesting in reference to plant distribution. The flora consists of nineteen species, none of which are endemic. They are all found on Tierra del Fuego, and it

appears at first strange that so few vascular plants should have reached South Georgia. Skottsberg solves the problem by reference to the glacial history of South Georgia, for the work of Dr. Gunnar Andersson shows that the whole flora must have been exterminated by ice; Skottsberg accordingly explains that only species, of which the seeds can be transported by wind or birds, have been able to reoccupy South Georgia.

The longest of the botanical memoirs yet issued is the first part of Dr. Skottsberg's monograph on the sub-Antarctic and Antarctic marine algæ; this part includes only the Phæophyceæ. In this section of the algæ, fifty-nine species were collected by the expedition, and these are described in a memoir of 172 pages with ten plates, a map of the world illustrating oceanic circulation, and 187 figures in the text. The expedition obtained sixteen new species and four new genera; one new genus has such abnormal characters that its affinities are quite uncertain, and the other is made the type of a new family, the Ascoseiraceæ. The author divides the floras into an Antarctic group, including ten species, a sub-Antarctic group, and a group of species of very wide distribution. Eleven species were found in the Graham Land region; two among them are included in the collections from the Ross sea. Dr. Skottsberg describes the seasonal relations of the flora, and points out that the marine algæ are quite abundant in the winter. This memoir makes it evident that amongst the colossal seaweeds of the Southern ocean there is still a rich harvest of new forms.

The calcareous algæ are described in a short report by Foslie, entitled "Antarctic and Sub-Antarctic Corallinaceæ." The collection includes thirteen species, of which three are new. Seven of them belong to *Lithothamnion*. The author of the report discusses the relations of the marine floras on the eastern and western sides of the Antarctic continent. With the present imperfect knowledge there may be a tendency to exaggerate the difference between the life of the two regions. M. Foslie points out that of known calcareous algæ, only one species occurs in both, and it is a small epiphytic form that may easily be carried on floating weeds; none of the attached species is found on both the shores of the Ross sea and Graham Land. The author, however, considers that a more thorough knowledge of the Antarctic calcareous algæ would probably prove a closer connection between the western and eastern floras than is indicated by the material at present available.

The Problem of Bipolarity.

The problem of most general interest which these collections elucidate is Sir John Murray's theory of bipolarity. The work of the four expeditions does not add much evidence in its support, though considerable differences of opinion are expressed on the subject. Whereas,

however, the opinions in its favour are hesitating and vague, those on the contrary are explicit and most emphatic. The authorities who give tentative support to the theory include Sir Charles Eliot and Mr. Hodgson. Sir Charles Eliot says, in reference to the Arctic and Antarctic nudibranchs, that "as far as the faunas are known," they "show considerable general resemblances," and he adds later "that the Arctic and Antarctic nudibranchs are similar rather than identical." He is much more emphatic in support of bipolarity in his report on the pteropods. Therein he says, "Whether we call the Antarctic forms varieties or species is, in reality, a comparatively unimportant question. That there are some differences of detail between them and the Arctic forms every one will admit; that the two sets of forms are nearly related is equally clear. The interesting point is that in both the Arctic and Antarctic seas the predominant, and as we approach the poles probably the only, pteropods are closely allied or even identical species of *Limacina* and *Clione*. The characters which these Arctic and Antarctic forms present are compatible with any hypothesis which assumes that they are derived one from the other, or from a common ancestor. Further, the distribution of the forms is interrupted by a wide zone in which they do not occur. None of them are recorded from within thirty degrees either north or south of the equator. I confess that I have no explanation of these facts which appears to me satisfactory."

Mr. Hodgson, in his report on the pycnogonids, advances one of his twenty-eight species as bearing upon the bipolarity question; for *Colossendeis australe* is much more nearly related to the Arctic *C. proboscidea* than to any other species, and he asks, "How is their present position at the opposite ends of the Earth to be accounted for?"

The evidence against bipolarity varies from the mild objection of Mr. A. E. Smith, that the mollusca fauna "does not show any particular resemblance to the Arctic fauna; indeed, the majority of the genera have almost a world-wide distribution," to the emphatic condemnation of Dr. Trouessart, who says the theory is belied by the facts that all the species common to both polar regions are cosmopolitan, and have been slowly transported from one area to the other. He concludes that "en définitive le bipolarité n'existe pas." Dr. Calman discusses the question in reference to *Crangon antarcticus*, which had been regarded by Ortmann as a near ally of the North Pacific species, *C. franciscorum*, that had reached the Antarctic seas by migration southward along the western coasts of America; Dr. Calman, after careful comparison of the two species, concludes that the resemblances are of no "great morphological importance," and he indicates marked differences between them; and he points out that Prof. Coutière, in his monograph on the decapods collected by the *Belgica*, proposes to make the Antarctic species a new genus *Notocrangon*. Some of the authors on the collections of the

Gauss also refer to bipolarity, such as Meisenheimer in his report on the Pteropoda, and Lohman on the Acari, and they both oppose the theory.

In the report on the rich collection of echinoderms collected by the Scottish expedition, Prof. Koehler is almost as emphatic as Dr. Trouessart; he remarks that the question of bipolarity "est jugée depuis longtemps," and he holds that the Arctic and Antarctic echinoderm faunas are completely different.

A CONTRIBUTION TO THE TOPOGRAPHY OF NORTH-WESTERN GREECE.*

By the Rev. Canon C. M. CHURCH and Prof. J. L. MYRES.

The north-western corner of free Greece, the shores of the Ambracian gulf, have been but little, if at all, explored by the traveller since the time of Colonel Leake's travels in Northern Greece, now a century ago—1809. No tourist has left any detailed account of that district since that same time when Byron and Hobhouse landed from Prevesa on the southern shore of the Gulf of Arta, "where lone Lutraki forms its circling cove," and traversed "Acarnania's forest wide," and "marked the scenes of vanished war—Actium, Lepanto," † scenes of the two decisive naval battles fought off the shores of Acarnania.

It is difficult to find any description, by pen or pencil, of what Leake with unwonted fervour describes as "that beautiful inland lake" of Arta; or of "that remarkable mountain of the Macrynoros," which rises precipitously at the head of the lake above its eastern shore to the height of more than 2000 feet, and whose passes form the key to continental Greece—the Thermopylæ of the western coast. Through these passes over the mountain, and by the cornice road along the declivities above the shore, the Turkish pashas of Ioánnina from time to time poured their Albanians into Greece. Twice in the war of Independence the Greeks held the passes successfully against the Turks—first in 1821, at the outbreak of the revolution; and in its last year, 1829, when the Greeks under General Church surprised the passes, cut off the communication with the fortresses of Mesolonghi and Lepanto, forced the surrender of the garrisons, and the evacuation of the provinces of Acarnania and Ætolia, and ultimately obtained the inclusion of those western provinces within the boundaries of the Greek Kingdom in 1832.

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* Map, p. 52.

† It is well known that the so-called "battle of Lepanto" was fought off the Curzolari islands, at the mouth of the Acheloos (Aspropotamos), on the south-western shore of Acarnania.

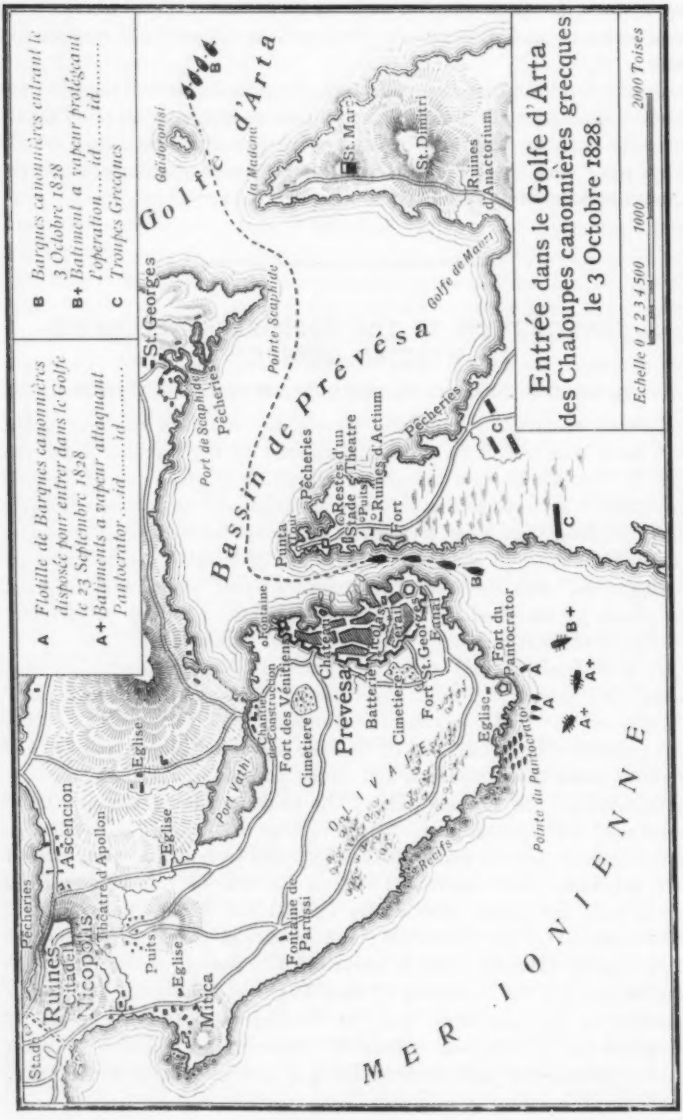


FIG. 1.—THE FORCING OF THE STRAITS OF PREVESA BY THE GREEK FLOTILLA.

These operations, like the country in which they occurred, have passed almost undescribed hitherto. Finlay, for example, dismisses them in a couple of lines. The passage of the Greek squadron under

the batteries of Prevesa "secured to the Greeks the command of the Gulf of Arta. The town of Vonitza, a ruinous spot, was occupied by the Greek troops on December 27, 1828, but the almost defenceless Venetian castle did not capitulate until March 17, 1829. The passes

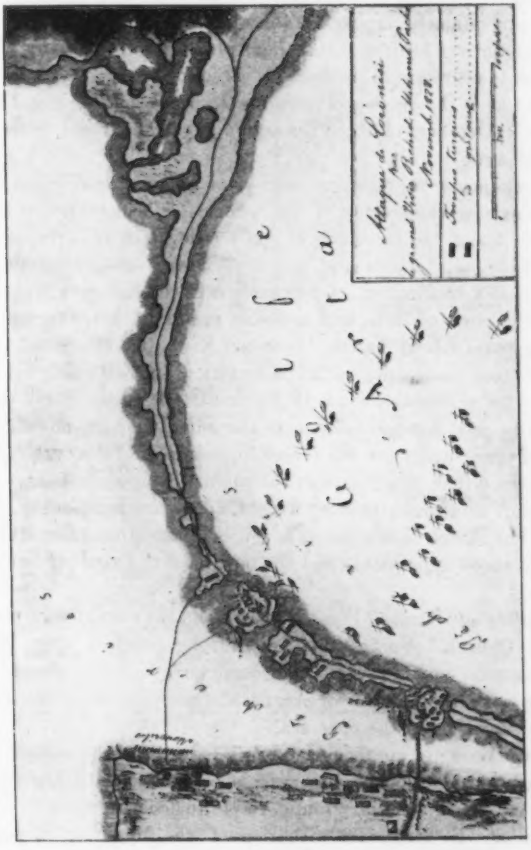


FIG. 2.—NORTH SHORE OF GULF FROM SALAGHORA TO KORONISI.

of Makrynoros were occupied in April." * The campaign, however, as will appear, is not without military as well as topographical interest.

The accompanying plans, selected from the papers of General Sir R.

* 'History of Greece' (ed. Tozer, Oxford, 1877), vol. 7, p. 39. For a general view of the field of operations, see Fig. 7, p. 54.

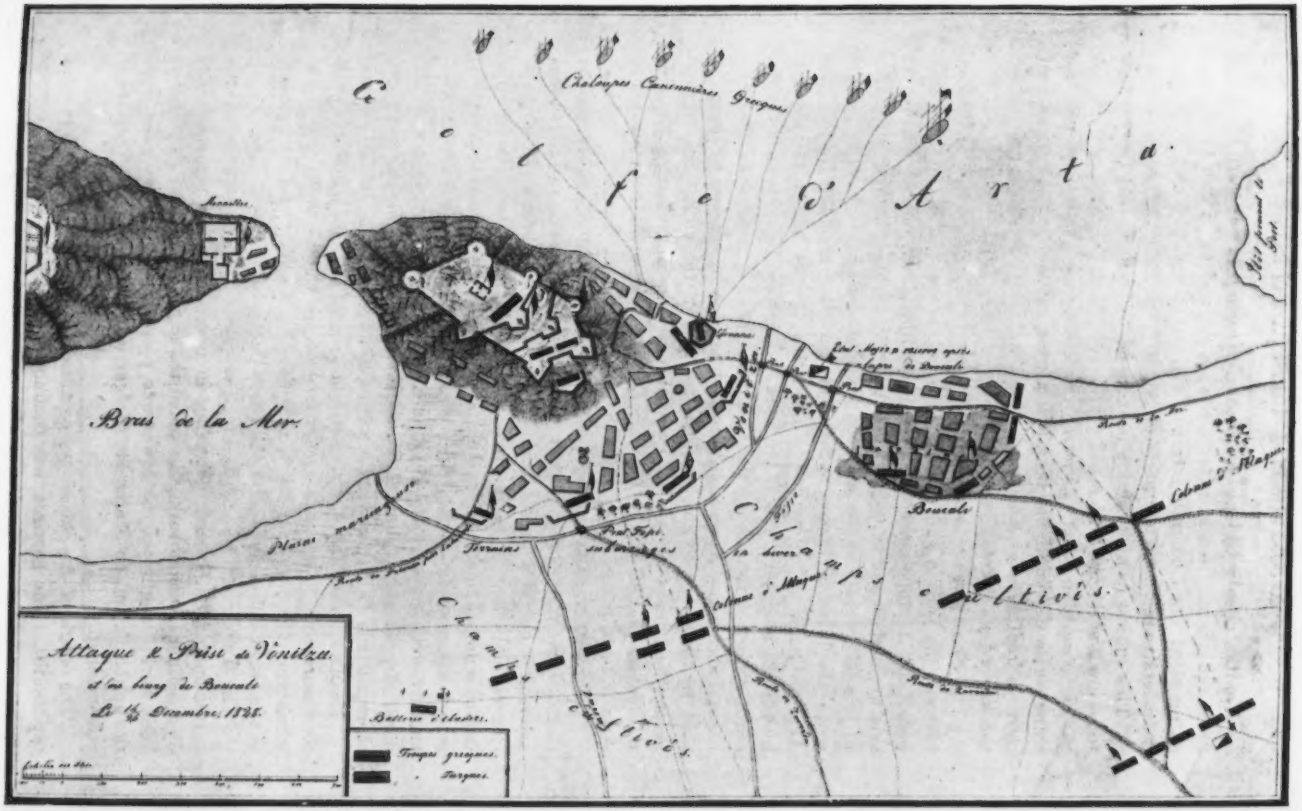
Church, now in the British Museum, were drawn by Captain Jochmus, a Bavarian officer, who was aide-de-camp to General Church in 1828–9, and afterwards lieut.-general in the Austrian service. Some other plans illustrative of Greek topography, made at the same time by the same officer, and contributed by him in later years, are to be found in the *Journal* of the Royal Geographical Society, vol. 27, p. 1. In the dearth of any plans of the topography of this particular district of the Macrinoros and the Gulf of Arta, these plans may be worthy of notice. The incidents represented in them are as follows:—

The forcing of the straits of Prevesa by the Greek flotilla (Fig. 1). This took place in October, 1828. This action gave the Greeks possession of the Gulf of Arta.

The occupation of the thread of land from Salagora to Koronisi (Fig. 2) was the next in this series of operations. The northern side of the gulf, which forms the foreshore of the fertile plain of Arta, is formed by a series of small islands and peninsulas, separated by lagoons which are often wholly landlocked. Open anchorages off Salagora and Koprena served as the ports of Arta, and possible means of communication with Prevesa by sea. About halfway between them lies the island of Koronisi, which, communicating with the mainland by two nearly continuous sandbars—one north-westward to Salagora, the other north-eastward round the Logari lagoon—offered at the same time an advanced base and post of observation for the Greek squadron, and a secure refuge for the numerous Greek families from the plain. Koronisi was accordingly occupied, and reinforced now by a detachment under General Church himself. The sketch is of some interest, because, since 1828, the coast-line has advanced appreciably and the outline of the sandbar has altered also.

The capture of Vonitza (Figs. 3 (plan) and 4 (view)) was the work of General Church. Vonitza lies in a strong position about halfway between Lutraki and Prevesa, and commands a knot of roads communicating with the interior of Acarnania, and also with the ports of Leukas and Zaverda on the open sea.

The castle occupies an abrupt and isolated hill on the eastern side of the entrance to a land-locked bay. It is connected with the mainland by a broad stretch of alluvial ground, liable to floods in winter. Readers of Thucydides will recall the situation of the Megarian Minoa, save that the civilian quarter of Vonitza lies round the landward base of the citadel, and along the shore to the eastward, while the steep western arm of the land-locked bay, opposite the Vonitza castle, is unoccupied except by a monastery. The view (Fig. 4) reproduces a picture which hung in General Church's library at Athens in 1848. It is taken looking east towards Vonitza castle, from a point on the shore of this bay, between the words "Bras de la mer" on the plan, and the monastery, a ruinous angle of which appears beneath the tree in the foreground.


Golfe d'Arta
Chaloupes Canonnières Grecques
Bras de la Mer
Plaine marécageuse
Route de Vonitza par Tirmina
Position des Troupes Françaises
Route de Vonitza par Salaora
Route de Vonitza par Prevesa
Route de Vonitza par Salaora
Route de Vonitza par Prevesa
Route de Vonitza par Salaora
Route de Vonitza par Prevesa

Vonitza, closely besieged all through December, was stormed on the 27th, and the garrison shut up in the castle; and on March 17 Vonitza surrendered on honourable terms, and its three hundred Albanian defenders were conducted safely to Punta.

This success (which Finlay is inclined to belittle) left Church free to secure Macrinoros if he could.

The occupation of the passes of the Macrinoros (Plan 5) forms the third series of operations indicated above. It stopped the passage of convoys from Arta to Kervasara, Mesolonghi, and Lepanto, and forced the surrender of those fortresses.

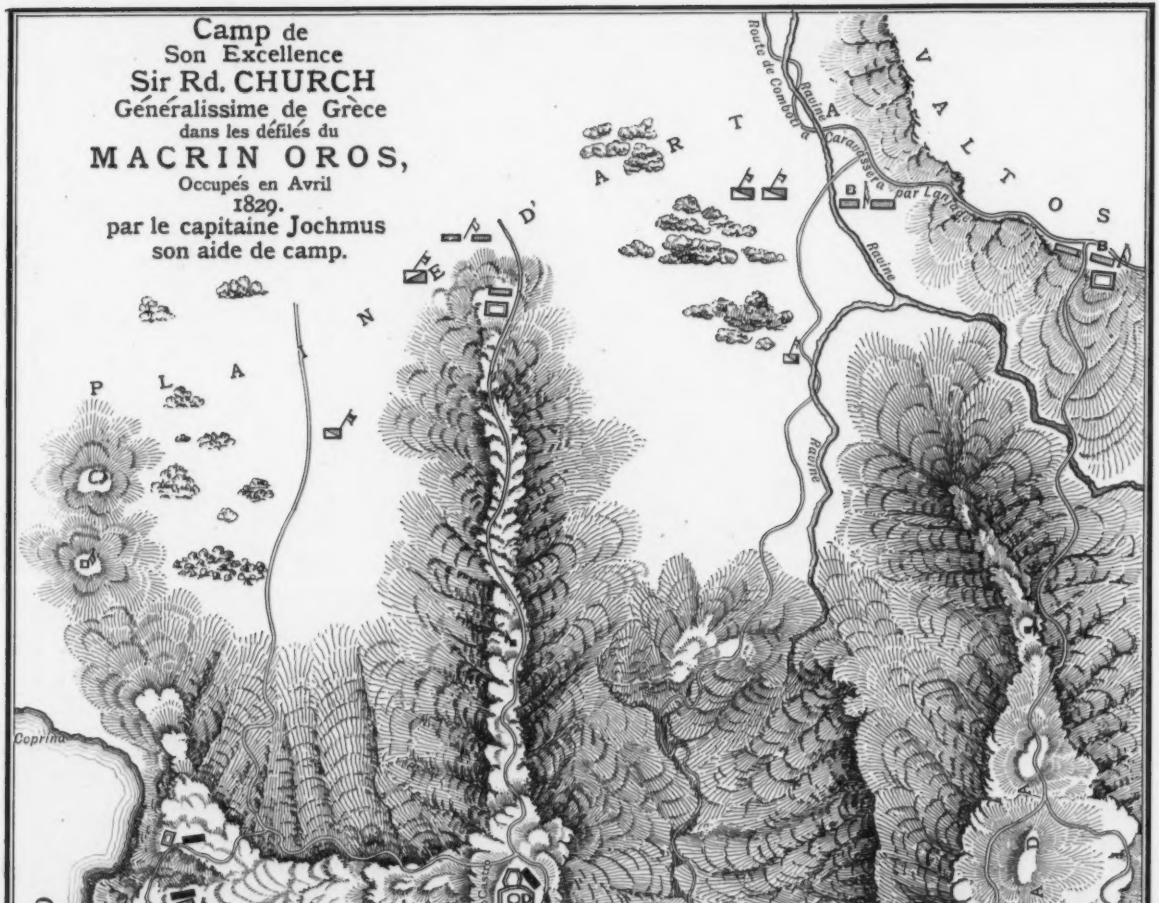
The Macrinoros is the range of mountains and forest wedged in between the head of the Gulf of Arta on the west, and the deep-sunk bed of the Aspropotamos on the east, falling down on the north-west side to Comboti and the plain of Arta, with a ridge running up north to join Mount Djumerka and the Epirote chain; overlooking on the south the lakes of Rivios and Ozeros, and the middle valley of the Aspropotamos. The castle of Kervasara lies at the south-western foot of the mountain, and at the head of the long bay which forms the south-eastern extremity of the Gulf of Arta. It commands the most natural access into Acarnania from Epirus both by sea and by land. A road by the shore of the gulf, at the foot of the cliffs, winding and precipitous, forms a pass of a day's journey from Kervasara by Menidhi to Comboti on the plain of Arta. Other tracks cross the mountain to Arta from points in the basin of the Aspropotamos.

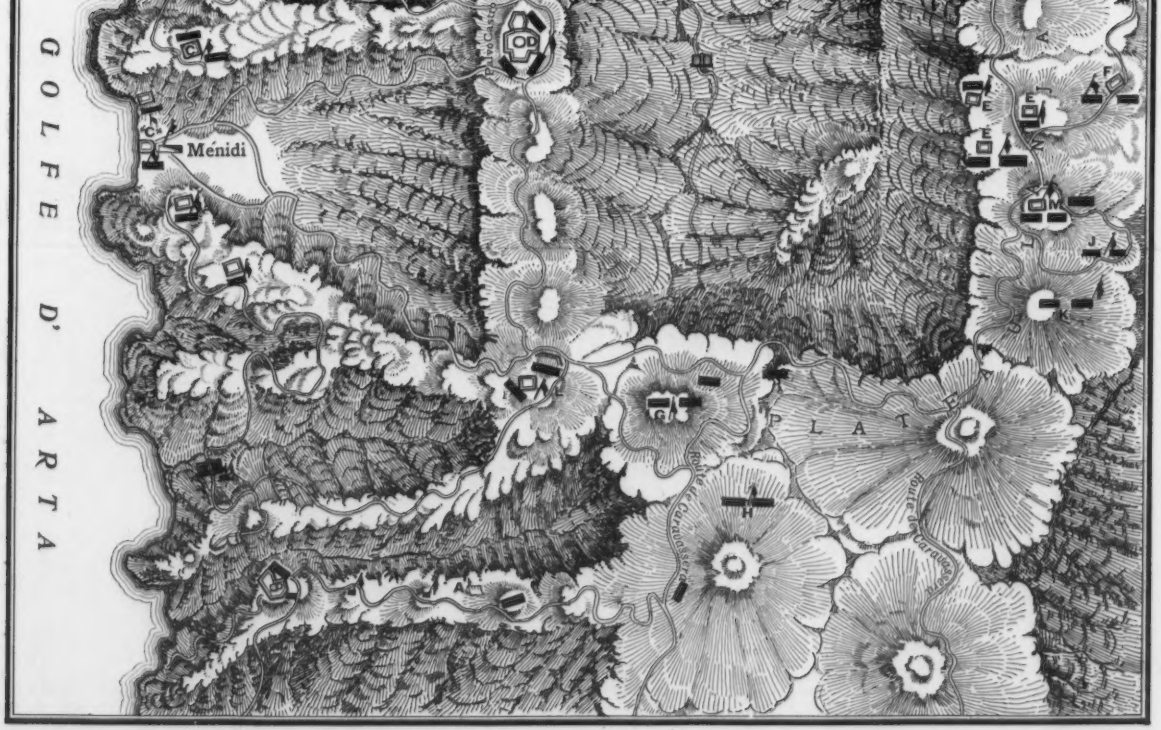
Information had reached General Church that a convoy was at Comboti, waiting for an escort to cross the mountain to Kervasara. Leaving a garrison in Vonitza, and some men to threaten Kervasara, Church embarked by night from Lutraki in the boats of the flotilla, landed a detachment at Menidhi, midway on the cliff road to Arta, and seized the station on the road, while the boats went back to fetch another detachment. His men, climbing the western ravines in the dark, surprised at daybreak a Turkish outpost on the heights, and drove them into the Paleo Castro of Macrinoros, a fortified post on the plateau.

Meanwhile another body had been ordered to make a circuit round Kervasara, and to advance as skirmishers up the southern face of the mountain; these finding the lower posts unoccupied, pressed onwards to the ridge and closed round the Paleo Castro on the south side.

The Turks had been completely surprised by the rapidity of the movement. The Greeks, increasing in numbers as the boats brought up fresh men from Lutraki, blockaded the garrison in the Paleo Castro; guns were brought up, the tower was bombarded by heavy guns from the gunboats, and on March 29, the garrison surrendered on promise of safe conduct.

The effects of this success were immediate, and on April 7 Kervasara capitulated. The garrison was conducted by a detachment of Greeks


Camp de
Son Excellence
Sir Rd. CHURCH
Généralissime de Grèce
dans les défilés du
MACRIN OROS,
Occupés en Avril
1829.
par le capitaine Jochmus
son aide de camp.
Route de Combotti
Ravine Caravaserra par Langada
Ravine
Coprina
Catoo



Explication des signes et des Lêttres

	Infanterie Grecque	A	*Quartier General de Sir R. Church*	J	*Troupes Staïco*
	Artillerie	B	*Troupes de Velim Bey, Foussouf Aga, de.*	K	,, *Peschli*
	Poste avancé	C	,, *Gelizenna Jani Costa*	L	,, *N Botzaris*
	Infanterie Turque	D	,, *Nicolo Zerva*	M	,, *Varnakiottis*
	Cavalerie	E	,, *Gardak Griva*		
	Poste avancé	F	,, *C.Vlacopulos*		
	Postes établis en maçonnerie pour la defence des routes	G	,, *Tschonga*		
		H	,, *Dimochilio*		

Echelle
0 250 500 750 1000 *Pas*

FIG. 5.—GREEK OCCUPATION OF THE MACRINOROS DEFILES IN 1829.

[*To face p.* 52.

along the coast road by Menidhi through the Greek camp to the entrance of the plain of Arta, and the sick and wounded and baggage were taken across in the Greek boats to Coprena.

FIG. 4.—VONITZA CASTLE FROM THE SOUTH-WEST.

FIG. 6.—ARGOS AMPHILOCHICUM.

So, within a fortnight of the fall of Vonitza, the Greeks had seized and occupied the passes of the Macrinoros, and the fortress which was the key of the province of Valtos.

The garrisons of Lepanto and Mesolonghi were now cut off from hope of relief, and, suffering from want of provisions, they capitulated, Lepanto on April 30, Mesolonghi on May 17. Their garrisons, the last body of Turkish troops remaining in Acarnania, were escorted by Varnakiotti, with a division of General Church's army, through Acarnania to the Gulf of Arta and Prevesa on their return to Albania.

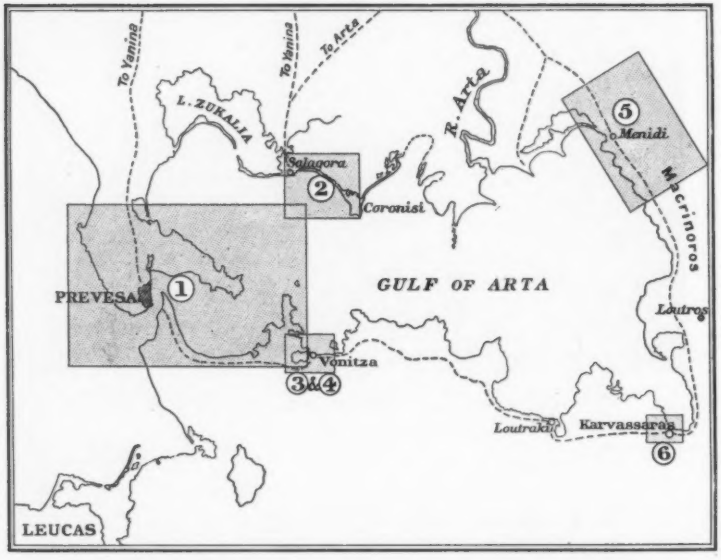


FIG. 7.—GENERAL SKETCH-MAP SHOWING THE AREAS COVERED BY FIGS. 1–6.

The last diagram (Fig. 6) represents an ancient fortress on the shore at Kervasara, very completely preserved. The sketch is labelled "Argos Amphilokicum" (Amphilochicum), but the true site of this name lies some miles further north, up the east coast of the gulf, in the last considerable valley which is crossed by the coast road before it reaches the cornice of the Macrinoros. It is also at some distance from the sea. The nearest ancient site to Kervasara is Limnæa, a mile or two southwards up the valley which connects Lake Rivios with the gulf.

CAPTAIN AYLMER'S JOURNEY IN THE COUNTRY SOUTH OF THE TANA RIVER, EAST AFRICA.*

We have received through the Colonial Office, from the Government of the British East Africa Protectorate, a detailed account of a journey from Kibwezi to Kitui, which was carried out last year by Captain L. Aylmer, of the King's African Rifles. The journey led through the little-known country between the Athi and the Tana rivers, where existing maps vaguely show the upper courses of the Tiva (or Nsao) and the Thua (or Nsua) rivers. Two or three travellers have followed routes near to that traversed by Captain Aylmer. Dr. J. L. Krapf, Dr. J. G. Kolb, and the late Mr. A. H. Neumann passed a little to the west, while Dr. Kolb, on his expedition in 1895–96, seems to have gone over much the same ground between the Tiva and the Thua rivers that Captain Aylmer has now covered. The latter, however, has accomplished an interesting bit of work by tracing the course of the Tiva for a considerable distance below Ikutha. Native reports as to where the river flowed have been of a very conflicting character, some describing it as a tributary of the Tana, others giving it a separate outlet to the sea near Kipini, and others again affirming that it ended abruptly in the desert. In 1906, parties in charge of native police officers were despatched both from Kitui and from Lamu with the object of settling the question, but accomplished practically nothing. The party under Captain Aylmer left Kibwezi, on the Uganda railway, early in July of last year, about a month after the end of the rainy season at Nairobi. It was found, however, that the rains occur earlier in the country explored than in the highlands, and since also the fall had been less than usual, the expedition was considerably hampered in its movements by the scarcity of water.

The first day's march from Kibwezi brought the expedition to the Athi river, and another day's march to Ikutha, on the Tiva river, where a German mission station has been established. On setting out from Ikutha to explore the course of the river downwards, Captain Aylmer was accompanied by thirty-nine porters—Wanyamwezi, Wakavirondo, Wakikuyu, and Wakamba. Of these the Kavirondo men were a conspicuous failure, while the Wakikuyu, though behaving well, proved to be very susceptible to fever. Generally, the Wanyamwezi are considered to be the best porters, but Captain Aylmer considers that in bush country the Wakamba and other tribes, who carry their loads slung on the back from a strap over the forehead, are preferable to either the Wanyamwezi or Swaheli, who carry their loads on their heads, and continually have to lower their burdens in order to pass under the overhanging bush. The river-bed was dry, except for occasional pools, the water in which

* Map, p. 120.

was brackish but not unwholesome. Inquiry elicited the information that the river never flows for more than a few days at a time, though sometimes after rain the rush of water is so great that it is difficult, if not impossible, to cross from one bank to the other. On the maps it has been customary to mark here and there the occurrence of falls in the river, but nowhere along that section of the course explored by Captain Aylmer was any place observed to which that description could be applied. Possibly, however, when the stream is flowing its course is broken by rapids along stretches where the rocks outcrop. Below Ikutha the sandy bed of the river, averaging in width from 25 to 35 yards, winds between the Yatta hills on the right or western bank, and the lower spurs of the Ukamba hills on the east. On either side it is bordered by a belt of dom palms and other large trees, interspersed with green vegetation, and beyond this belt extends thick thorn bush country. Here and there, where a rocky spur comes down from the hills, the trees along the banks give place to the bush, and not infrequently the rocks form a barrier right across the river, holding back a perennial supply of water in deep pools. Round about these pools were observed numerous tracks of big game, including elephant, lion, rhinoceros, and leopard; but most of the tracks were a week or ten days old, and Captain Aylmer thinks it not improbable that most of the game had removed to the vicinity of the Sabaki, or lower Athi river, where there is a more permanent supply of water.

Nearly midway between the 38th and 39th meridians of east longitude the Tiva river, which has followed up to that point, from its source some 15 or 20 miles north of Kitui, a generally southerly course, though with a growing easterly trend, takes a sharp turn to the east, and continues at right angles to its former course. About 20 miles lower down it is crossed by the native trade route from the Sabaki to Kitui, and a few miles beyond the river-bed was found by Captain Aylmer to be split into numerous small channels, which disappeared into a patch of very thick forest extending about 8 miles from west to east by 4 miles from north to south. This forest the branches of the river traverse lengthwise, re-uniting on its eastern borders, and continuing as before, though the channel is smaller and more overgrown with vegetation. The bush, which had made travelling very difficult and confined the expedition for the most part to the bed of the river, had gradually become more open as the expedition advanced eastwards, and on the eastern side of the forest, in about 39° E., dom palms and forest trees occurred only here and there along the banks, the course of the Tiva lying between open flats of soft cotton soil bounded by slightly rising ground covered with bush. The soil is mostly of the reddish variety, and with irrigation would be very fertile. Game was fairly plentiful at the time of the expedition's visit, and Captain Aylmer describes the number of birds as almost miraculous. Every

morning about seven o'clock the air was thick with doves coming to water; spurfowl, partridge, and guinea-fowl were to be seen everywhere, and the lesser bustard, sandgrouse, and a few pigeons were also observed. Both birds and animals were extremely tame, taking scarcely any notice of human beings, and not in the least disturbed by rifle-shots. Throughout the journey bees were a perfect pest in camp, though the native porters seemed to be impervious to their attacks, and would rob their nests for honey without any protection. Among trees and bushes various species of thorn were the most abundant, but near the river-bed there also occurred, in addition to the dom palm, the tooth-brush tree, the umbrella-shaped acacia, the bushy evergreen called by the Somalis "gurus," which is invaluable to travellers in bush-country, as it is easy to climb and affords a good view from the top; and the candlestick tree (*Candelabra euphorbia*), which was welcome as one of the few kinds of trees giving any shade from the sun, and which also served as a guide to the course of the river, growing all the way along at a distance of about half a mile from the banks. Baobabs were conspicuous by their absence along the lower river, though numerous near the hill country. Captain Aylmer notes that the nuts of the dom palms differed from those found at Mombasa and elsewhere along the coast, being larger and not sweet, but rather unpleasant to the taste.

North of the forest was found a group of half a dozen water-holes surrounded by dense thorn-bush, and accessible only by the paths trodden down by elephant and buffalo. The water lasts only two or three months after the rains, and was nearly exhausted when the expedition left, after encamping there for ten days. No water was discovered in the river-bed east of the forest, but native report represented the Tiva as ending in a lake three days' march from the forest, and while the expedition was encamped at the water-holes, Captain Aylmer, with a picked body of men, started off to verify the information. A day was lost through the party losing the course of the river; water was running short, and one of the party was attacked by dysentery. Captain Aylmer was therefore obliged to turn back in about 39° 30′ E., when a few miles short of the reported position of the lake, after a journey of about 50 miles from the water-holes north of the forest. Fairly recent elephant tracks and fresh rhinoceros tracks were observed at the point of turning, but the course of the river was scarcely recognizable, being merely a series of channels in a bed overgrown with reedy grass and bush, perhaps half or three-quarters of a mile in width. There were no signs of natives nor any indication that they had been there for a long time past.

On the return journey the expedition struck north from the Tiva at the point where it is crossed by the track from the Sabaki. For two days' march the track ran through dense bush country, where

even along the path it was impossible to walk upright for more than a few yards at a time. The only water—greenish in colour, but cool and not bad to the taste—was found in holes at the end of each day's march. Not until early in the third day's march was there any sign of human habitations. Then the expedition came upon an outlying Kamba village of the Gagindu district, and thence onwards the road wound from one inhabited district to another. The supplies of water were still of the scantiest, and Captain Aylmer found the Akamba living in fairly well-defined communities, adjacent to some water-supply, which was usually a spring in the mountains, dammed a few yards from its source so as to provide a drinking-place for the native cattle. Sometimes these settlements were separated from one another by a distance of seven or eight hours' march, the intervening country being quite devoid of inhabitants. One day's march from the Gagindu district brought the expedition to the Mudtha district, and another day's march to Vor, on the Thua river. This river Captain Aylmer describes as similar in its characteristics to the Tiva, but considerably larger, averaging 50 yards in width. Continuing northwards along a bend of the Thua, the expedition entered the Sombi district, where a good supply of sugar-cane is grown, together with bananas and other food stuffs. Several streams descend from the Mutuluni hills in the west and the Mutito hills in the north to join the Thua in the Sombi district, fertilizing the soil, and giving the country a rich and prosperous character. The bush round Sombi is still very dense, but the country is more open on the north side of the river towards the Mutito hills. For a few miles beyond Sombi the trade route to Kitui follows the south bank of the Thua, and then branches off westwards and ascends the Mutuluni hills, from the top of which the Government station at Kitui can be seen about 6 or 7 miles away. The eastern slopes of the Mutuluni hills are uninhabited, but the country at the top supports a numerous population extending all round Kitui. The climate is appreciably cooler than in the river valley, though there is only about 1000 feet difference in the elevation. At Sombi Captain Aylmer found the nights pleasantly warm, and was able to dispense with blankets, whereas after ascending the Mutuluni hills he found that three blankets were not too many for comfort. No game was seen after leaving Sombi, where it was fairly plentiful, and where the natives complained of the damage done to their crops by elephants.

According to native report, the Thua runs into the Tana, and Captain Aylmer also learned of the existence of a lake called Utisi, situated four marches down the Thua and one away from it in a southerly direction. This lake is a favourite resort of native elephant-hunters, and several of the Akamba declared that they had visited it. They hunt with bows and poisoned arrows, and are said never to make

use of spears. A curious custom of theirs, when fighting, is to give quarter to a defeated enemy if the latter catches his opponent's breast in his mouth. The Akamba file their teeth in two ways. Among some of the tribes it is the custom to file all the front teeth to a needle-like point, the effect being extremely repulsive, while among others only the insides of the two middle front teeth are filed. All of them drink enormous quantities of *tembo*, an intoxicating liquor of which there are two varieties—one made from sugar-cane and bananas, while a better kind is made from fermented honey. The old men, according to Captain Aylmer's observations, appeared to be seldom sober, and the spirit is of such bad quality that they soon acquire the most debauched appearance. They have the reputation of being fond of poisoning strangers, and on the whole are a trying people to deal with; but if their assistance can be secured, they will often work hard and willingly, and display a good deal of intelligence.

A plane-table was carried by the expedition, but, owing to the character of the country, it was found impossible to use it effectively. Viewed from any elevation, the country might easily have been mistaken for the sea. There was not a break in the horizon, and nothing to be seen but a shimmering blue haze above miles and miles of dry bush. Compass bearings were taken along the Tiva river, but even in these allowance must be made for a considerable margin of error, owing to the absence of prominent points. The usual difficulty was experienced in ascertaining the native names for particular features, but Captain Aylmer succeeded in compiling a useful list of the general names for "river," "lake," "hill," etc. A collection of rock specimens found by the expedition contained nothing of value. Quartz abounded everywhere, but no shale formation was seen which gave promise of coal.

In its main purpose, to trace the Tiva river throughout its lower course, the expedition failed; but useful experience and knowledge of the country were gained, and Captain Aylmer believes that another attempt made immediately after the rains in a good year would undoubtedly prove successful, and the exact courses of both the Thua and the Tiva rivers would be located.

THE GEOGRAPHICAL DISTRIBUTION OF RAINFALL IN THE BRITISH ISLES.*

By HUGH ROBERT MILL, D.Sc.

In considering the geographical distribution of any condition over a given area, the first essential is a clear view of the position and

* Summary of a course of six lectures delivered at the request of the Council of the Royal Geographical Society, January and February, 1908.

configuration of the area in question. The importance of the position of the British Isles from the point of view of climatology, and especially of rainfall, lies in its relation to the continent on the east and the ocean on the west, in the track of the prevailing south-westerly winds which blow from ocean to continent, carrying warmth and wetness to the land they first encounter. Ireland, standing well to the west of the larger island, and thus enjoying the more oceanic climate, is remarkably open to the sweep of the wind. The central plain is practically continuous, broken only near the edges by the mountain groups of the north-west and the north-east, and by the more compact masses of high land which run through the south of the island from south-west towards north-east, forming a fairly continuous highland belt from Kerry to Wicklow. Great Britain shows a more elaborate vertical relief, the great groups of high land being clearly marked off from one another by plains narrower than that of Ireland, but, like it, stretching in most cases from sea to sea. In order, from north to south, the lofty land-masses include the Highlands and the Southern Uplands of Scotland, each filling nearly the whole breadth of the country and separated by the Lowland Plain, with its lines of low ridges and abrupt bosses of volcanic rocks. Lying, as Scotland does on the whole, to the west as well as to the north of England and Wales, it possesses distinct differences in climatic character from South Britain. The southern and larger part of Great Britain may be best divided into a western and an eastern division. The Western comprises the separate highland masses of (1) the Lake District; (2) the Pennine Chain; (3) Wales; and (4) the western horn of Cornwall and Devon. These four groups of elevations are separated by low plains, over which the rivers, taking their rise in the high ground, pass to the sea. The Eastern Division is, in the main, a plain traversed by long ridges of low hills of well-marked individuality radiating from near the Bristol Channel to the north-east and east. The line commencing with the Cotteswold Hills stretches, now higher, now lower, to the moors of the North Riding of Yorkshire. The next line, including the White Horse Downs and the Chiltern Hills, though broken by the flat of the Fenland, rises again in the Wolds of Lincolnshire and the East Riding of Yorkshire; while the third line runs broadly through Salisbury Plain and splits into the curved sweep of the North Downs and the South Downs, with the Forest Ridges between them, each of the members of the system being defined and separated from the others by narrow plains. The river systems of the country emphasize the divisions of the plain, which bounds the masses of high ground and serve as the most natural units of surface for the discussion of rainfall data. Taken as a whole, the vertical relief of the land is the effective agent in directing the action of wind and all climatic conditions arising from the effect of aspect, shelter and direction of movement.

Before bringing into relation the land and the rain, it is necessary to consider the character and causes of the latter. The term "rain," for purposes of measurement, includes all forms of condensation of water from the atmosphere, not merely the fall of liquid drops. The principal agent for the transformation of solar radiation into work is water, which, evaporated from the surface of the hydrosphere, ascends as vapour and is condensed and precipitated whenever it reaches a height where the temperature is below the point of saturation, and when appropriate nuclei are present, upon which condensation of water can take place. These nuclei are usually considered to be supplied by dust; but it is now suggested that the part may be played by electrons also. While it is the lowering of the temperature of air which produces condensation of the aqueous vapour into water, the most usual cause of fall of temperature in masses of air is the ascent of the air either by expansion, due to heat or release of pressure, or by wind blowing along the rising slope of a land surface; ascending air may thus be looked upon as practically the only cause of rain. When condensation takes place in minute globules, the friction exercised by the air retards their fall so greatly that they often appear to float as clouds; but the apparent stability of a cloud is frequently an optical effect due to the formation of fresh cloud above and the simultaneous evaporation of the water globules below when they fall into air which is not saturated. In a cloud formed in saturated air the globules have an opportunity to run together and fall in drops, which sometimes attain a considerable size. In a cyclonic system, and still more in a whirlwind, there is a rapid ascensional movement of air, and these conditions are consequently associated with excessive precipitation; electrification also plays an important part in the production of torrential rainfall. The magnitude of rain as a working power in nature can only be realized when one remembers that all the water of every river is merely rain on its way back to the sea, whence it came.

The method of measuring rainfall is very simple, but many small precautions have gradually been discovered to be necessary in order to secure satisfactory results, and thus it happens that there are few good records of rainfall of any great length. Christopher Wren designed, in 1662, the earliest rain gauge, which has been described; but the first known record was begun at Paris in 1668, and the second at Townley Hall, near Burnley, in 1677. Very few records exist before the commencement of the nineteenth century, and our comprehensive knowledge of the distribution of rain over the British Isles may be said to have started in 1860, when the late Mr. G. J. Symons initiated the British Rainfall Organization, and in 1861 published 507 records for the year. The work of this organization is still carried on in Mr. Symons's old house, 62, Camden Square, London, but now it deals with the records of 4500 stations every year. Experiments were made in the early days to

determine the best form of instrument and the best method of observation, and the outcome was to establish the use of the Snowdon pattern of rain gauge, 5 inches in diameter, or the Meteorological Office pattern, 8 inches in diameter (the two differ only in size), set with the receiving surface 1 foot above the ground, read once daily at 9 a.m., and recorded to the date of the commencement of the twenty-four hours to which the reading refers. Elevation above the surface of the ground or exposure to strong wind causes a loss in the catch of rain, on account of ascending eddies formed round the instrument, and various sheltering devices have been employed in very exposed places to counteract this effect. Rainfall observers in the British Isles belong to all classes of society, and for the most part they do the work voluntarily on account of its interest to themselves; the efforts of the Rainfall Organization —which, unlike the state-supported rainfall services of all other countries, is a private and self-supporting body—being mainly (1) to collect the records and publish them in the annual volumes of 'British Rainfall'; (2) to encourage accuracy and regularity in observers; and (3) as far as is practicable to endeavour to enlist the aid of new observers in the large areas where as yet there are no rain-gauges. New records are urgently wanted in all parts of Ireland and of the Scottish Highlands, but also in many parts of England, such as Northumberland, the East and North Ridings of Yorkshire, in the west of Wales, and in general in all places more than 500 feet above the sea.

The first essential in mapping rainfall is to make sure of the accuracy of the individual records on which the map is based. It is a rule to which the longest experience offers no exception, that rainfall varies gradually from point to point. The gradation may sometimes be very gentle, sometimes almost abrupt; but whatever the period may be for which the rainfall is plotted, an erroneous figure stands out with manifest discordance. A map is thus a valuable means of detecting errors which may usually be corrected by inquiry or by comparison with neighbouring records. The distribution of rainfall may be delineated by means of isohyetal lines similar to isotherms or isobars, and the areas of maximum rainfall may be brought into prominence by the use of deepening tints of colour. The general rainfall or mean depth of rain over a particular area is best obtained by measuring the area between successive isohyets, multiplying the area by the mean rainfall of the zone, adding all such volumes together and dividing by the total area. In this way the difficulty of irregularly distributed stations, which would falsify an arithmetical mean, is practically overcome. In the case of mapping the rainfall of a single day—which is very often the rainfall of the natural unit, a shower—the most important precaution is to make sure that all the observations used were made at the same hour and entered to the same date. This can be done much more readily in the case of heavy than in the case of

light rains. The area enclosed by an agreed-upon isohyet to represent the superficial extent of a shower may conveniently be referred to as a "splash," and such splashes are very sharply defined in the case of thunderstorm rains, or the rain accompanying a line squall. But when the rain accompanies or is produced by a moving depression of the familiar cyclonic type, the result is a series of confluent splashes, which forms a belt across the country, and may be comprehensively termed a "smear." The smear, as a rule, lies mainly to the left of the track of a depression. A heavy shower may dominate the rainfall of a month, but in the course of a year the inequality due to any one shower ceases to appear. The peculiarity of heavy showers due to meteorological causes, such as a thunderstorm, a squall, or a cyclone, is that they depend upon the condition of the air alone, and may fall with equal intensity in any part of the country—on a mountain, on a plain, or over the sea; the configuration of the land seems to exercise no control upon them.

While the rain of a heavy shower shows no trace in its distribution of any effect of configuration or of the elevation of the land, the total rainfall of a year, whether it be relatively a dry year or a wet one, shows so complete a congruence with the configuration that there can be no doubt as to the relation of cause and effect. The highest annual rainfall is always in the neighbourhood of the highest land; the lowest is always on the low and level plains. A map of average rainfall isolates the groups of high land as areas of high rainfall, with nearly the same precision in most cases as a map coloured for elevation. The Highlands of Scotland, the Southern Uplands, the Lake District, the Pennine Chain, Wales, the western horn of Cornwall and Devon, and the mountains of Ireland, all stand out as wet areas, and even the gentle hills of the Eastern Division of England are seen to be wetter than the surrounding plain. It appears probable that after deducting from the annual total the heavy rains due to meteorological causes there remains the bulk of the rain which must be assigned to geographical causes and which is in all probability produced by the cooling of the air consequent on the uplift of the wind blowing over ascending slopes. This very reasonable deduction has not yet been rigidly proved, because it is exceedingly difficult and laborious to separate into meteorological and geographical showers the rainfall for a number of stations sufficient to allow a map of any particular year to be drawn.

The dependence of rainfall on configuration, which is apparent in the rainfall map of any year, is much more marked when the average rainfall of many years is considered. The making of an average rainfall map is beset by special difficulties. The length of the period is important because the total rainfall of one year varies greatly from that of another; and, speaking generally, the wettest year amounts to 150

per cent. and the driest to 65 per cent. of the average, and even a period of ten years may be much in excess or much in defect of the average of a longer period. The rainfall record maintained at Camden Square shows an average of 25·0 inches for fifty years; but the five consecutive decades from its commencement gave averages of 25·5, 25·5, 27·0, 24·0, and 23·5 respectively, the wettest individual year (1903) was 38·10 inches, and the driest (1864) 16·93 inches. A period of thirty-five years is the shortest time which can yield a really satisfactory average rainfall in the British Isles, and probably the rainfall of one period of thirty-five years does not differ from that of any other by more than 2 per cent. As it is impossible to make a map from the small number of thirty-five years' records which exist, it is necessary to apply a correction to the means of shorter records so as to allow for the relative dryness or wetness of the years they comprise. Reinforced by such computed data, the long records suffice for the compilation of a very satisfactory rainfall map of the British Isles to be compiled; but the labour, or, in other words, the expense, of doing so would be very considerable. The best way of making a true average rainfall map would be to prepare a complete map of the rainfall of each year since records were sufficiently numerous, and then to combine these by some mechanical method so as to produce a map on which every individual yearly total would receive due weight. The preparation of annual maps from the current year back to 1870, or perhaps to 1865, is now in progress.

Average rainfall maps of many small districts have been prepared by the method of correcting the shorter records to their equivalent averages for thirty-five years, and such maps of counties on a small scale have been published in the Geological Survey's 'Water Supply Memoirs' for Lincolnshire, Suffolk, East Riding of Yorkshire, Northamptonshire, and Bedfordshire, while they are in preparation for Kent, Sussex, Oxfordshire and Hampshire. In the case of some counties the number of observing stations is so great that it has been possible to plot the data on maps of the large scale of 2 miles to an inch. The result has been to show that the relation of average rainfall to configuration is astonishingly close, and to prove that in bare patches for which no records are available the contour lines of elevation may be taken as guides for the most probable run of the isohyets. The relation is nevertheless not altogether a simple one, as it involves altitude, slope, and exposure to the prevailing wind. It is found, for instance, that while the rainfall gradually increases with altitude on the slope facing the prevailing wind, this increase continues for a short but variable distance down the leeward slope, the suggestion being that the wind forced to rise by the slope of the ground towards the summit continues to ascend for a short distance after the summit is passed, and drops the maximum rainfall from the point where it attains its greatest height.

Reference was made in the last lecture to the economic aspects of rainfall, the damage done by floods and torrential falls, the influence of rainfall in agriculture, the rapidly increasing importance of the question of water supply for consumption in towns, and for the generation of electrical power. The problem of water supply was shown to be one of national and not of merely local importance, and it is in its main lines a geographical question which ought to be dealt with in a far more comprehensive way than the public or even statesmen yet realized.

Some instances of the manner in which rainfall had influenced architecture and processes of agriculture were pointed out and illustrated, as were all the points in the lectures, by lantern slides.

WADE'S METHOD OF DETERMINING LONGITUDE.

By E. J. SCOTT, B.A., F.R.G.S.

Mr. E. B. H. Wade, M.A., late of Trinity College, Cambridge, and at present of the Egyptian Survey Department, has devised a new absolute method of determining longitude by observations of the moon. He claims that his new method possesses advantages over the method of occultations, and gives results whose precision is second only to those obtained by telegraphic means. He recently described, at a lecture before the Survey Department at Giza, the instrument he has invented, and has now published a full account of his instrument and method in a report on 'A Field Method of determining Longitude' (Survey Department, Cairo). The accompanying plate is reproduced from that publication by the kind permission of Captain H. G. Lyons, F.R.S., F.R.G.S., F.G.S., late R.E., Director-General, Egyptian Survey Department.

The method is an adaptation of the old method of lunar distances, but no attempt is made to measure actual distances or altitudes. The observations consist in obtaining contacts between a star and the reflected image of the moon, and the only readings required are the clock times (L.M.T.) of the contacts. The principle is the determination of the times at which the moon is a certain (unknown) apparent distance first from one star and afterwards from a second. By the ingenious use of a prism, three distinct contacts of each star with the moon's limb may be timed; thus in comparison with the timing of the single instant of immersion, which alone is available in observing an occultation, there is a great reduction of the risk of error.

The instrument consists of a horizontal $2\frac{1}{2}$-inch telescope, so mounted on a pedestal or tripod that it may be rotated both in azimuth and about its own optical axis. These rotations are controlled by slow-motion screws, but do not require to be measured. And it is not necessary to level the telescope, the horizontal position being adopted merely for the convenience of the observer.

In front of the object glass of the telescope is a mirror (called the field mirror), whose plane is inclined at an angle of 45° to the optical axis of the telescope, and which is rigidly attached to the telescope. The effect of the field mirror is to reflect the line of sight through the telescope at right angles to its original direction; and it is clear that, though the telescope itself is kept horizontal, the reflected line of sight can be directed to any star by suitably moving the telescope in azimuth

and rotating it about its optical axis. Pointing at any star is instantaneously effected by the help of a finder, a small telescope fixed at right angles to the big one, so that its axis is parallel to the reflected direction of the line of sight of the latter.

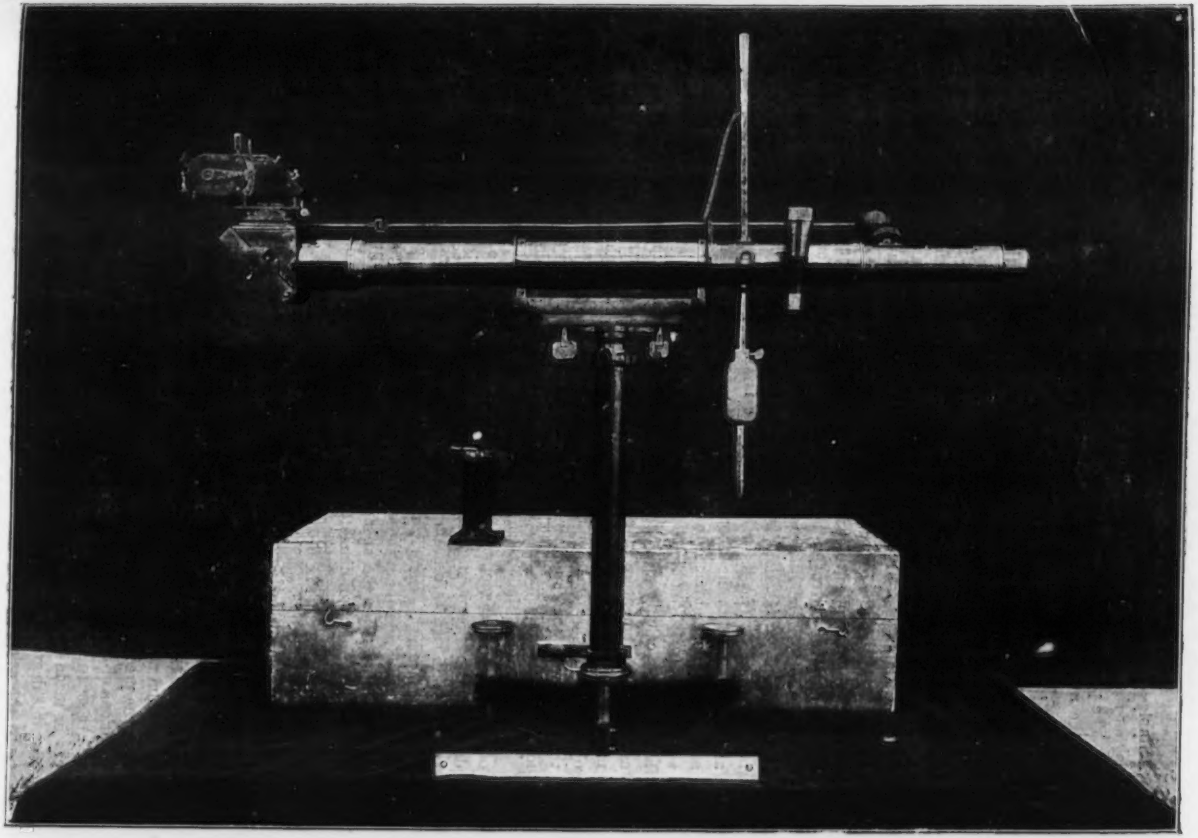
On the top of the object glass end of the telescope, and directly opposite to the field mirror, so that the reflected line of sight must pass through it, is a box which is practically a box sextant, and is so called. By a very conveniently arranged tangent screw, the box sextant may be rotated about the reflected line of sight as axis. As the bearings on which the box sextant revolves are fixed, a test is necessary to determine whether its axis of revolution coincides with the reflected optical axis of the telescope. For this purpose a very simple collimator is provided, and adjustments are made by slightly altering the position of the field mirror by regulating screws. The adjustment to avoid collimation error is the only one which is necessary, and it rarely needs to be verified, as the instrument is very rigid.

The box sextant contains two mirrors. One, called the horizon glass, is fixed at angle of 45° to the line of sight (as reflected by the field mirror), and the other, called the index glass, is opposite to it, and movable about an axis parallel to the plane of the horizon glass. An index is attached to the movable mirror, and a small scale, reading by estimation to degrees, is provided, so that the deviation of a ray of light reflected at both index and horizon mirrors may be known roughly to within a degree or two.

When the finder is directed towards a star, a ray from the star passes through the box sextant to the field mirror, and thence to the eye, without meeting and being reflected by the sextant mirrors. At the same time rays from the moon are reflected into the telescope from the index, horizon, and field mirrors (in that order), provided that the inclination of the index glass, as shown by its scale, corresponds to the angular distance of the moon from the star, and that the box sextant is suitably rotated about its own axis. As its axis coincides with the path of the star's ray, the necessary rotation can be performed without disturbing the pointing at the star. To avoid irradiation the two sextant mirrors are not silvered, and the brightness of the moon as seen through the telescope is about that of a sixth magnitude star; tinted shades are therefore unnecessary.

For an observation, the index glass is clamped, and the moon is allowed to make its own apparent contact between its limb and the star by means of its own motion relative to the star. While waiting for a contact, the motion of the star in altitude and azimuth is easily followed by rotation of the telescope in the two degrees of freedom permitted by its mounting, as already explained. A contact is obtained for each of three different distances, not by moving the index glass as in a sextant, but by deviating the path of the rays of light by means of a prism, which is placed in a slide between the horizon and index glasses. The prism has two faces nearly parallel, so that the refracting angle contained by them is very small. According as the prism is placed with the refracting angle vertical to the right, or horizontal in a middle position, or vertical to the left, so respectively will the image of the moon be deviated to a greater distance, or to (within the second order of small quantities) practically the same distance, or at a less distance, from the star than if the prism were not interposed at all. Hence the lunar distance at which contact occurs can be made to increase or diminish through three values not differing much from one another by altering the position of the prism in a manner which is perfectly definite, and which involves no ambiguity.

Two stars are selected near the ecliptic, one on each side of the moon (*i.e.* preceding and following it), and nearly equidistant from it. The exact local time having been noted at which one star is at a certain definite but not measured apparent lunar distance, the time at which the second star is at the same apparent



FIELD LONGITUDE INSTRUMENT. ($\frac{1}{3}$ ACTUAL SIZE)

(Designed by E. B. H. Wade.)

lunar distance is found. The method may therefore be called the method of lunar equidistances, though the equidistances are not simultaneous. A programme of suitable stars must be prepared, and this can be done very easily with no more labour than is necessary for predicting the circumstances of an occultation.

The process of observation consists in clamping the index mirror at the angle for the roughly estimated lunar distance; the instrument is then pointed at the first star, and the three times of the three contacts between the star and the moon's limb are taken, and the mean of these times is adopted; the instrument is then rotated and pointed at the second star, and the mean of the times of the three contacts is similarly found.

The computation consists in assuming a value for the longitude, and thence calculating the apparent lunar distances of the two stars for the local times at which they were respectively observed. The two distances as observed are exactly equal, hence if there is a difference between the two calculated distances the discrepancy must be due to an error in the assumed longitude. Half the amount of the discrepancy applied to each of the calculated lunar distances would make them equal, hence the correction to be applied to the assumed longitude is that corresponding to half the difference between the calculated distances. If the stars are favourably placed (*i.e.* not far from the ecliptic), and if the assumed longitude is not much in error (*i.e.* if the half difference is small), it is sufficiently accurate to assume that the rate the moon moves relative to the stars is 1 second of arc in two seconds of time, and hence the correction to be applied to the assumed longitude is two seconds (or 30″ of arc) for every 1 second of time of arc of the half difference between the calculated lunar distances, which is delightfully simple. If the assumed longitude were much in error, it would be necessary to find and use a more exact value for the rate of the moon's motion, or, which would be easier, to obtain a first approximation by a rough provisional computation, and then repeat the work with that approximate longitude to get the final correction. For the former of these two alternatives a graphic method might be devised.

The details of the computation are very similar to those for the determination of longitude by the method of occultations. The geocentric right ascensions and declinations of the moon and stars are taken from the 'Nautical Almanac,' and the corrections in right ascension and declination for parallax and refraction are calculated and applied. Here it may be noted that Mr. Wade gives a very neat and simple method by which these corrections may be obtained graphically. From the corrected quantities the apparent lunar distances are immediately obtained. The moon's corrected semi-diameter is found as usual, and is added or subtracted as necessary to obtain the calculated values of the two distances which by observation are equal.

The whole method compares most favourably with that of occultations. The instrument consists chiefly of telescope, and is quite as portable as the telescope required for observing an occultation, for which purpose it can be used if necessary. Any number of observations can be made any night that the moon is visible, instead of the small number on the comparatively rare occasions to which the occultation method is limited. The preparation of a programme is not more difficult than the prediction of the circumstances of an occultation. And, finally, the computations of the two methods are strictly analogous.

As regards the accuracy of the method, the frequency with which observations can be made has rendered it easy to discuss sources of error and to estimate the probable degree of approximation obtainable. The gravest source of error appears to be the acknowledged inaccuracy of the ephemeris positions of the moon; the astronomer royal kindly furnished the amounts of the errors in R.A. (averaging

7″ or 8″ of arc) observed at Greenwich during the time in which Mr. Wade's test observations were being made; the amount of the error is to be deducted from the difference between the calculated lunar distances before the longitude correction is deduced therefrom. So, too, must be deducted a correction for personal equation or systematic error, which can be found by taking observations in a place whose longitude may be assumed to be correctly known. It is one of the advantages that this method possesses over that of occultations, that personal equation can be easily determined, and still more easily applied.

Ephemeris errors and systematic or personal equation having been allowed for, Mr. Wade, in a severe discussion of his method, estimates that, apart from errors in determining local time, which of course are common to all methods, there is a probable error of 1·5 seconds of time (22″·5) in the longitude of a place as determined by a single pair of lunar equidistances. By increasing the number of observations this figure can be much reduced. In 'Hints to Travellers' the probable errors quoted for different methods are: for the determination of difference of longitude by the transport of five half-chronometer watches, a quarter of a mile; and for absolute longitude by an occultation of a star (one observation, which is all that is in general available, and even that seldom), ½ to 1½ mile. Mr. Wade's method therefore promises to prove a most valuable addition to our means of determining longitudes, and it deserves to be brought to the notice of competent observers, and to receive their careful consideration.

ADMIRALTY SURVEYS DURING THE YEAR 1907.*

Under the orders of the Lords Commissioners of the Admiralty, eight of His Majesty's vessels, with three small hired vessels, manned by 87 officers and 794 men, have been employed on hydrographical surveys both at home and abroad.

The Marine Survey of India, in charge of an officer of the Royal Indian Marine, has been continued, as in previous years.

A detailed report of Admiralty Surveys has been drawn up and presented to Parliament. The following is a brief summary:—

During the year 1907, no fewer than 508 rocks and shoals dangerous to navigation have been discovered, and their positions fixed. During the same period 656 miles of coast-line have been charted; and an area of 4436 square miles has been sounded over by H.M. surveying vessels.

On the *South Coast of England*, re-examination was made at places within the harbours of Portsmouth and Plymouth, and their approaches.

In the *English Channel*, attempts were made to register the amount of rise and fall of the tide in deep water, at various positions. Sounding operations, also, were made off Start point, and westward of the Scilly islands, on account of reported shoal soundings; but in each case the charted depths were corroborated.

On the *East Coast of England*, re-examination was made of some of the channels at the mouth of the Thames, and north of the Goodwin sands.

On the *Coast of Scotland*, in the Isle of Skye, the chart of the entrance to Loch Ewe was completed, and that of the entrance to Loch Broom begun. In the Orkney islands, the passages between Mainland, Burray, and South Ronaldsay islands were surveyed, together with the waters surrounding the northern half of the latter island. In the island of Mull, the re-survey of the Sound of Mull was completed, as well as that of Loch na Keal.

* Kindly supplied by the Hydrographer.

On the *Coast of Ireland*, a re-survey of the Skerries (County Dublin), and of the entrance to Lough Carlingford, was carried out; as well as a new survey of Ballygerry bay and Rosslare harbour (County Wexford), including Greenore point and the banks to seaward.

The surveying ships in home waters have also carried out magnetic observations, both ashore and afloat, for Declination, Horizontal force, and Dip, at several places in the above localities. All surveying operations round the British isles were greatly impeded by bad weather.

On the *Coast of Newfoundland*, the survey of St. Margaret's bay was completed, together with the waters surrounding New Férolle point; and a large area northward of the Fogo islands.

On the *West Coast of Africa*, Cestos bay, on the Liberian coast, was surveyed.

On the *Coast of British Columbia*, northward of the Queen Charlotte islands, a large area of Dixon entrance, leading to Port Simpson, was surveyed; together with plans of Masset harbour, Virago sound, with Naden harbour, and Parry passage; all in Graham island, the northernmost of the Queen Charlotte group.

In the *Red Sea*, a survey was made of the locality and approaches to the petroleum wells of Gimsah; and, further south, of the approaches to Mahommet Ghul.

Extensive sounding was done off the *Southern Coast of Socotra*, in search for a reported rock; and Aden was connected with Cape Guardafui by meridian distance.

On the *Coast of Ceylon*, the coast survey was continued from Barberyn lighthouse to the southward and south-eastward, beyond Galle harbour; including large-scale plans of the latter port and its approaches. The coast outside Trincomali harbour was also surveyed.

The *approaches to Penang* have been re-sounded; and on the *Coast of British North Borneo*, a chart of Maruda bay nearly completed.

On the *Eastern Coast of Australia*, the approaches to Cairns harbour (Queensland) have been surveyed, and carried out to the 100-fathom line.

On the *Coast of China*, a survey completed of Challum bay; and of a large area between the mainland, and the outlying islets known as The Brothers and Lamock islands; also of Bias bay, and of the southern entrance to Mirs bay.

The Marine Survey of India for 1907 includes the completion of the eastern archipelago of the Andaman islands; a portion of the Arrakan coast of Burma, including Andrew bay; and a strip of the western coast of India, immediately southward of Bombay.

During the year the Hydrographic department has published 87 new charts; and 35 plates have been improved by the addition of 62 new plans; while 509 plates have received large corrections and additions; to the number of 8250.

The number of charts printed for the Government and the general public during the year amounted to 486,392; while 1922 Notices to Mariners have been issued.

REVIEWS.

EUROPE.

English County Bibliographies.

'Hertfordshire Maps. A Descriptive Catalogue of the Maps of the County, 1579–1900.' By Herbert George Fordham. Pp. xii., 182. 19 *Illustrations*. Hertford: Stephen Austin & Sons. 1907. 4°. 50 *copies privately printed*.

In 1901, Mr. Herbert George Fordham, of Odsey, the present chairman of the Cambridgeshire County Council, began to publish in the *Transactions* of the Hert-

fordshire Natural History Society and Field Club, a descriptive catalogue of all maps of Hertfordshire from 1579 to 1900, which were to be found in public or in private libraries. So far as Hertfordshire is concerned, the requirements of the King's printer of 1626 have been amply satisfied, and the way is now clear for any other geographical enthusiast to make a similar list for any other county, English, Scottish, Irish, or Welsh.

Mr. Fordham gives bibliographical and biographical notes to each map entered, and there are copious indexes, giving the chief works of reference, an alphabetical list of titles of all atlases and maps, and of the names of all authors, engravers, and publishers. For a similar undertaking in English, we must go back as far as the year 1780, to Richard Gough's 'British Topography,' issued in two volumes, an excellent work, and the mainstay of every geographical curator. In France and Germany we find eminent geographical bibliographers, but nothing quite to equal the achievements of Mr. Fordham in a difficult and untrodden field. Geographical bibliography is, unfortunately, in England neglected by the Bibliographical Society, and there is no provision by the State for the uniform publication of classified bibliographies of maps. In America, when any political question arises, the Library of Congress publishes a special catalogue of maps in their map collection, and of books in their library.

In England, vast as the Empire is to-day, there exists no staff, nor any funds for this purpose, even at the British Museum, which, beyond question, contains the largest and the finest collection of atlases and maps in the whole world. The 'British Museum Catalogue of Printed Maps' was printed in 1885, a quarter of a century ago, but is sadly incomplete, and at times inaccurate. A second edition, recording the title, engraver, scale size, and publisher of each atlas and map, would be of the highest value to every library and geographical student throughout the civilized world. The 'Museum Catalogue of Manuscript Maps' has not advanced beyond volume 3, published in 1861, nearly half a century ago, and there is no alphabetical record of the manuscript maps acquired between 1861 and 1907, and there is actually no index of draughtsmen, artists, or places to volumes 1–3 (1844 to 1861). The Museum Catalogue of the maps, plans, and views which have strayed to the Department of Prints is not yet published, but, in any case, the collecting of printed maps by two departments of a national museum must be very costly to the poor tax-payer.

The British Museum will next year celebrate the 150th anniversary of its foundation. A printed catalogue of all its cartographical treasures would form a fitting memorial of an historical event which has conferred upon its promoters a claim to a more lasting and peaceful fame than they ever anticipated in those times of almost universal war, when the heroic struggles of General Wolfe had not yet culminated in the final glory of the heights of Abraham.

It is to be hoped that the success of Mr. Fordham in the almost untrodden paths of county bibliography will lead others to follow in his footsteps, and we shall look forward with equal pleasure, and we hope profit, to his exhaustive work on the maps of the county over whose council he so ably presides.

ASIA.

Himalayan Exploration.

'Ice-bound Heights of the Mustagh.' By Dr. and Mrs. Workman. London: A. Constable & Co. 1908. *Maps and Illustrations. Price* 10*s. net.*

On first opening this book the excellence and fulness of the illustration immediately strike the eye. The photographs, over 170 in number, and some of

them charmingly coloured, are not merely illustrative of the text, but have been taken by a photographer who knew how to choose his point of view, and how to select his subject. With hardly an exception they are sharp and clear, and the process work has likewise been admirably done. Not only is this true of the views of great mountains, but also of the little bits in the valleys, such as the admirable rose-tree among rocks on p. 11. In cases where figures are introduced, the moment chosen is when the grouping of them is either very fortunate (as in the glacier caravan, p. 97) or admirably arranged (as in the raft scene, p. 37).

The authors have now devoted five long seasons to the exploration of the mountains of the kingdom of Kashmir. Their work has been in a high degree laborious, and their accomplishment considerable. They have made detailed surveys of good quality of many parts of these most intricate ranges. They have repeatedly reached very high altitudes, and they have added largely to our knowledge of what is perhaps the most notable mountain region in the world. From time to time they have given account of their doings in papers read to our society, and published in the *Journal*, so that there is no occasion here to repeat in briefer form what has already been set forth at more length in these pages.*

The present volume is devoted to the doings of two seasons, 1902 and 1903. In the former year they made the first thorough exploration of the recesses of the Chogo Lungma (glacier). In the latter they explored the interesting Hoh Lumba, and then returned to continue work on the Chogo Lungma. The important and interesting map which accompanies this volume is the best evidence of what they accomplished. It enables every step of their way to be followed as described in the text, and it transforms the queer-looking region of the old map into a consistent mountain and glacier system. In one corner of the map a curious "cornice glacier" is marked, apparently surrounded by cols and peaks, with no outlet anywhere. This is of course impossible. The glacier is a tributary of the Biafo, as no doubt it is intended to appear, and its hollow is in fact the real continuation of the depression in which the Biafo lies, the great gap east of it, through which Snow lake drains, having been broken down in the process of time by an overflow from that great ice-reservoir, which formerly discharged itself down the Hispar glacier. The west ridge of the Kailasa peak is easily seen from all the upper part of the Hispar glacier to be a continuation of the ridge that looks down upon that glacier's south bank. Lovers of mountain literature will find plenty to interest them in the text of this carefully prepared volume.

MARTIN CONWAY.

AFRICA.

THE EASTERN DESERT OF EGYPT.

'A Preliminary Report on the Geology of the Eastern Desert of Egypt between Lat. 22° N. and 25° N.' By W. F. Hume. Survey Department, Cairo. Paper No. 1. 1907. 72 pp., 5 pl., 4 maps. *Price* 150 *millièmes*.

The recent resumption of mining in the Nubian desert has aroused fresh interest in the geological structure and geography of the region lying to the south-east of Egypt between the Nile and the Red sea, and we owe to Dr. W. F. Hume, of the Geological Survey of Egypt, an important contribution to the knowledge of that area. The result of his surveys are now issued on two topographical and two geological maps on the scale of 1 to 500,000, a plate of sections showing the main features in the structure of the country, and a valuable preliminary report of seventy-two pages. The area described in the report includes the sites of some

* *Journal*, vol. **25**, p. 245; **27**, p. 129; **31**, p. 12.

prehistoric mining fields, where, according to Dr. Hume, the mining operations were exceptionally well conducted and very extensive. The archæological evidence which Dr. Hume collected leads him to the view that the work is Egyptian, under some slight degree of Greek influence. The mines worked gold-quartz veins, which, as is the case in so many mining fields, occur where masses of diorite and syenite have been intruded into schists, but are absent or scarce where the intrusions are of an acid granitic rock. There are also ores of copper and hæmatite, and Dr. Hume has made the first discovery of chromite in this district.

Perhaps the most interesting of the mineral deposits are the emeralds. The general geological conditions of the emerald mines have been described in the paper by Dr. Donald A. MacAlister, "On the Emerald Mines of Northern Etbai," published in this *Journal* (vol. 16, 1900, pp. 537–549, map). According to Dr. Hume's description of the mode of occurrence of the emeralds, they appear to have been developed in the contact zone between gneiss and schists, and they are associated with rocks rich in tourmaline. One apparent difficulty in this explanation is the four-fold repetition of the emerald-bearing bed on the hillside at Sikait. This repetition, however, Dr. Hume attributes to the action of folds.

The geological structure of this country consists of a great platform of Archæan rocks, granites, diorites, syenites, and wide sheets of schists. The next important member is the Nubian sandstone, which is extensive in the western part of the area. The Nubian sandstone in this district is all allotted by Dr. Hume to the Cretaceous, and the survey has been fortunate in the discovery of fresh fossiliferous horizons in the formation. One very interesting addition to the history of the Nubian sandstone is the discovery of a volcanic series interbedded in the base of the formation. The volcanic rocks include basalts, rhyolites, andesites, and diabase. The Nubian sandstone is often bounded to the east by faulting against the Archæan series. In the north-western corner of the sheet near Luxor, Dr. Hume has mapped the most southern known outcrop of the Eocene limestones of Egypt.

The report includes an interesting chapter on the wells, and the amount of water available appears to be generally adequate for a small party of travellers, but the wells are often difficult to find. This preliminary account shows that this south-eastern desert of Egypt is of great geographical and geological interest, and we shall look forward to the promised fuller description of the district and of its ancient mines.

J. W. G.

French Central Africa.

'L'Afrique Centrale Française.' By Dr. Auguste Chevalier. Paris: A. Challamel. 1907. Pp. xviii. + 776. *Price* 20 *fr.*

As stated in the sub-title, this is the (somewhat belated) official report of the Shari-Chad Mission of 1902–04, which was conducted by Dr. Chevalier, and the main object of which was to inquire into the economic resources of the vast region lately acquired by France about the Congo-Chad water-parting. "French Central Africa," as this great divide is here called, had already been crossed and even partly surveyed by Crampel, Dybowski, Maistre, Gentil, and other pioneers, and a line of forts—Bangui, De Possel, Sibut, Crampel, Archambault—had been erected along the beaten track between the Ubanghi-Congo and the Shari-Chad basins, the object being to link up the French Sudanese and Congolese territories by the permanent occupation of the hitherto little-known intervening fluvial slopes. The political aims being thus effectively served, a free hand was given to the "Mission Chari-Lac Tchad" to devote all its energies to the scientific study

of the physiography, natural history, ethnology, and material resources of the whole land, with a view to its profitable exploitation. It is no exaggeration to say that this ambitious programme has been fully carried out, as may be at once seen by an inspection of the two large-scale maps which accompany the text, and present a picture of the geographical, racial, and economic relations in these Central African wilds such as could scarcely be supplied by many civilized or long-settled regions—Persia, for instance, or the Indo-Chinese borderlands, or large tracts in the Brazilian Amazonian provinces. It is the thorough treatment of details that imparts its special value to Dr. Chevalier's report, which embodies the main results of the work done by himself and his worthy associates in almost every branch of geographical knowledge; so that, after this rich harvest, nothing but gleanings will be left for future adventurers in vast savage lands discovered but yesterday.

Most valuable were the fruits gathered during the five months' stay at Ndellé, present capital of Mohammed Senussi, Sultan of Dar-Kuti. Ndellé occupies a commanding position about the triple Congo-Chad-Nile watershed, and from it Dr. Chevalier was able conveniently to visit several points of great geographical interest. Such especially was the great "Lake" Mamun, which turned out to be only an extensive marshy depression which lies on the main route between Ndellé and Darfur, and is no doubt flooded at high water, but is usually inhabited chiefly by the pestiferous tse-tse fly, whose range is now known to extend as far north as Waday. Another more substantial discovery was the real Lake Iro, which was already reported by Nachtigal, but wrongly stated by him to receive the Bahr Salamat from Wadai. The Salamat flows some miles south of the lake, and reaches the right bank of the Shari some distance below Fort Archambault. Later the mission visited Lake Chad and surveyed the south-eastern parts; but, strange to say, the results are not clearly shown on the maps of this elusive basin. Nor is the stretch of dry land indicated which is now known to divide it into two basins. Is this a tectonic division, or is it due to recent subsidence? Our author believes, with others, that Chad was formerly far more extensive than at present, and in prehistoric (Neolithic) times drained northwards to the Mediterranean. He also shows that the Bahr-el-Ghazal is, so to say, both an outlet and an inlet, at one time penetrating from the lake far to the north-east, whence it received contributions from the now arid eastern Sahara.

He has much to say about the above-mentioned Sultan or Emir Senussi, one of the few Central African potentates who still enjoy a measure of political autonomy. He is a member of the Baghirmi dynasty, who, after the overthrow of Rabah, established himself in the Dar-Kuta district, where it will be a surprise for many to hear that he still continues the slave-raiding practices of the Arabo-Nubian and Central Sudanese chiefs, and this under the very eyes of the French agent stationed at Ndellé. On this point, as well as on the many shortcomings of the French authorities in their New Central African dominion, M. Chevalier is very outspoken. Senussi's razzias have depopulated the Ndellé district to such an extent that he has now to extend the range of his slave-hunting expeditions as much as eight days round about in order to make the game worth the candle. The captives are grouped in two classes: one destined for domestic bondage, the other for the Wadai and other foreign markets, just as in the days of Barth and Nachtigal. "Maintenant," exclaims M. Chevalier, "c'est le vide (et quel vide!) dans tout le Dar-Banda, où, pour ses razzias annuelles, Senoussi est obligé d'envoyer dorénavant ses lieutenants à huit jours au moins de Ndellé; c'est la dépopulation chez les Saras, chez les Moroubas," etc.; and the French administrators themselves are warned that, unless they mend their ways, in half a century the natives will have

completely disappeared, and "c'est le désert qui prendra possession de l'Afrique centrale française."

A large part of the book is occupied with numerous appendixes, in which are tabulated and described the geological, mineralogical, zoological, and botanical specimens collected by the mission. There are also six maps, eight plates, and 112 illustrations, which, however, are not all worthy of French art.

A. H. KEANE.

SOUTH AFRICA.

'Südafrika: Eine Landes-, Volks- und Wirtschaftskunde.' By Prof. Dr. Siegfried Passarge. *With 47 Plates, 34 Charts, and numerous inset Illustrations.* Leipzig: 1908. Pp. xxv. + 355. *Price 7.20m.*

For this general survey of the southern section of the African continent a special value may be claimed, both on account of its comprehensive character, and more particularly because it is no ordinary library-chair compilation, but the outcome of serious studies made largely on the spot by a trained observer of acknowledged authority in most branches of the natural sciences. It is not addressed so much to specialists as to ordinary intelligent readers desirous of acquiring a competent knowledge of a land presenting an unusual number of problems interesting alike to the naturalist, the political economist, and the statesman. One of these problems turns on the long-standing difficulty of reconciling the geographical environment with the ethnic and social relations, a difficulty scarcely felt in small areas such as Iceland or Sicily, but almost insurmountable in wide continental domains. It is rather naïvely remarked that here we have to help ourselves as best we can, and the plan adopted by the author is first to discuss the general physical features of the land; then its climate, on which so largely depend the flora and fauna; and, lastly, the human elements, their culture, social and political status. If, with all this, Dr. Passarge does not quite succeed in establishing complete harmony between the various factors under consideration, he at least follows an excellent programme, which is here developed with exceptional skill and competency. A jarring note, however, is struck when he attempts a solution of the racial problem, which in the near future must become the most pressing of all.

Another problem, not of the future, but of the remote past, concerns the origin of the Zimbabye monuments and associated gold-mines. This question is handled with the strictest impartiality, and, after duly weighing the arguments for Bent's and Maciver's views, Dr. Passarge winds up in favour of the former as much the more probable. He aptly remarks that, apart from all other considerations, the civilization represented by these remains is an intruder in South Africa. It is not native-born; "it comes from without, and it is most unlikely that it was developed from small beginnings in Africa itself."

Rather a novel feature are the numerous small-scale maps, which will be heartily welcomed by the geographical student, as greatly helping to understand the orographic, hydrographic, meteorological, and other physical conditions in this geologically ancient section of the continent. Thus there are charts clearly showing highlands, plateaux, terraced lands (karoos), and marine currents; divides, watersheds, and fluvial basins; isothermals and isobars, with their annual variations; summer and winter rainfall, and geological formations in connection with the characteristic transitions from the reptilian to mammal life in the Austral lands. All this makes it an ideal handbook for educational purposes, and from this point of view an English edition should command a wide circulation.

A. H. K.

AMERICA.

South American Rainfall.

'Die Niederschlagsverhältnisse von Sudamerika.' By Ernst Ludwig Voss. *With* 19 *Maps.* Ergänzungsheft No. 157 zu *Petermanns Mitteilungen.* Gotha: Justus Perthes. 1907. *Price* 6*m.*

The reader will share the regret of Herr Voss that he was unable to bring out the results of all his work on the climate of South America at the same time. Any treatment of the rainfall without simultaneous adequate consideration of the winds must lose much of the interest that the subject naturally possesses. The author, who held a meteorological post in the state of São Paulo, in Brazil, has collected a mass of statistics from different parts of the continent, which he has arranged in a convenient form for reference, and illustrated by a large series of maps. Unfortunately, the value of the latter is largely discounted by the absence of reliable information from many important areas. This is the more to be regretted because the meteorology of South America presents many distinctive features that deserve the most careful study.

The author recognizes that a large proportion of atmospheric moisture of the Amazon basin is derived from the evaporation from the rivers and streams and forest foliage, but does not refer to the fact that much of the area outside the streams is under water for a considerable portion of the year, especially in the west. The truth is that, for all practical purposes, the Amazon basin and some adjoining tracts play exactly the same part as an inland sea more than twice the area, as the author notes, of the Mediterranean. And this fact has some important consequences to which he does not draw attention. North of 20° south the Andes are in practically the same position as if they had the ocean on both sides, and there is only the local influence of their land-masses to interfere with the normal ocean distribution of winds. The result is that in the region of the south-east trades a very heavy rainfall occurs on the more eastern ranges of the Andes, the annual total being in many cases over 80 inches. Though naturally greatest in the summer months, it is by no means confined to them, and in many localities heavy rain occurs whenever the pressure is higher than usual and a strong wind blows from the southward. In the author's maps a continuous increase is shown from the rainless region in the west to the centre of the Amazon basin. There is no indication of a maximum in the eastern ranges of the Andes. Yet this tract of abnormally heavy rain is of the greatest importance, for it contributes an enormous volume of water to the western portion of the Amazon basin, and the inundations to which allusion has already been made. There is, in fact, a local circulation of water between the Andes and the plains to the eastward, which is of considerable interest.

The ocean character of the Amazon basin is also responsible for the rainless Pacific shore. The south-eastern winds are deprived of their moisture by the Andes, and there is no heated central area, even in summer, to reverse the air currents and bring in monsoon winds from the westward. Herr Voss attributes the want of rain to the low temperature of the sea-water drawn up from the ocean depths to supply the westerly currents, and this may explain why the west winds which blow intermittently in the immediate neighbourhood of the shore-line bring no rain to the coast, but it is insufficient alone to account for the deficiency of precipitation. There is a similar occurrence of cold sea-water on the west coast of Africa, but there the heating of the Sahara during the summer months causes an inflow of air from the Atlantic, and thus ensures an ample rainfall to the coast.

There is reason to believe that there has been a progressive desiccation of the Sahara since late Tertiary times. If this be so, it must have been accompanied by a corresponding increase in the rainfall on the sea-border. If the Amazon basin were upraised 1000 feet, a gradual transition to less humid conditions would result in an amelioration of climate to the west of the mountains. Such a transformation would appear to be in progress further to the southward.

It is not correct to say that when rain does occur on the rainless strip on the west coast, it is always in the form of torrential precipitation. The mist-like garua of Lima and the adjoining coast is exactly contrary in character.

Perhaps the most interesting features brought out by the maps is the persistence of the area of deficient rainfall on the borders of Ceará and Bahia, due to the surrounding mountains, and the small region of rainfall that maintains itself to the west of the lower Paraguay throughout the greater part of the year. By an unfortunate error, "16" has been printed "61" in each of the four seasonal maps; "O" for "W" on p. 10, line 18, of the text. One would wish, too, that the almost absolutely rainless strip of Peru and North Chile had not been coloured as a region of "excessive winter rain."

Meteorologists will look forward with interest to the early publication of the remainder of the author's work on the weather of South America.

J. W. E.

AUSTRALASIA AND PACIFIC ISLANDS.

The Western Pacific.

'Dreissig Jahre in der Südsee.' Land und Leute, Sitten und Gebräuche im Bismarckarchipel und auf den deutschen Salomoinseln, von R. Parkinson. Herausgegeben von Dr. B. Ankermann, Direktorial-Assistent am Königlichen Museum für Völkerkunde zu Berlin. Mit 56 Tafeln, 4 Karten und 141 Textabbildungen. Stuttgart: Strecker & Schröder. 1907. *Price* 10*m*.

This volume represents a gathering together of the vast amount of material which Herr R. Parkinson, who has lived in the islands of the South seas since 1875, and has been resident in the Gazelle peninsula, Bismarck archipelago, since 1882, has had unique opportunities for collecting. The importance of his work in the recording of vanishing data is shown by his statement in the preface that the natives even now bring their sons to see his collection of weapons and implements, to point out to them the objects used by their forefathers; and he alleges that twenty-five years hence the astonished Bismarck islanders will gaze at the weapons of their ancestors, stored in European museums, with the same wonder as is aroused in us by the sight of the implements of our Stone Age predecessors.

The first chapter deals with Neu Pommern (New Britain) and the French islands, and Herr Parkinson deplores, at the outset, "the leidige Frage" of geographical nomenclature, with regard to which this region has been peculiarly unfortunate. Native names, which he invariably prefers, seem almost unattainable, and where they occur they are frequently—as in the case of Amakata and Tombara—erroneously applied. Main features, such as large islands or mountain ranges, rarely have any native names, and the local names for each separate promontory or peak differ according to the people using them.

Different sections deal with Neu Mecklenburg (New Ireland), St. Matthias, the Admiralty islands, the Western islands (Ninigo group), the German Solomon islands, together with Nissan and Carteret islands, and the Eastern islands (Nuguria, Tauu, and Nukumanu). In each section a description is first given of the geographical features, illustrated by very numerous and excellent photographs mostly taken by the author, followed by an account of the people, their houses,

clothes, ornaments, and implements, etc.; and separate chapters are devoted to sociology (secret societies, totemism, masks and mask dances), legends, and tales, language, flora, and fauna. The final section gives the history of the discovery of the islands, with reproductions of early maps, from those of de Bry (1596) and Witfliet (1597) onwards. Even this excellent monograph is full, as the author himself laments, of gaps and queries. Even now in New Britain and New Ireland there are peoples of whose language not a single word is known, and who have never yet come in contact with white civilization.

The following is the author's view with regard to the racial affinities of the people he deals with. He quotes Dr. Hagen's opinion, that the type of the Bismarck archipelago is a distant type belonging to the Austral-Papuan area, which has developed there, and is nearly related to the Australian type, these two types together forming a secondary main variety of the human species. We know that the aboriginal Tasmanians showed affinities with the New Britain type; they had frizzly hair, while that of the Australians is curly or wavy. If we look at Alfred Wallace's map of Australia in 'Island Life,' there is no difficulty in explaining this similarity. At the beginning of the Tertiary period, the continent consisted of two main portions, western and eastern, separated by a broad arm of the sea. "It is noteworthy that at the present time Eastern Australia is inhabited by a frizzly-haired people, who, if not identical, are nearly allied to those of New Guinea and to Bismarck archipelago. [This statement is not true.] The people of Western Australia belonged to a different race, more probably nearly allied to the 'Alfuren.' [The Alfurus are not now recognized as a race. Dr. F. Sarasin, in his 'Versuch einer Anthropologie der Insel Celebes, Zweiter Teil' (1906), does not make use of this term, but he describes the Tóala of Celebes, whom he regards as related to the Veddah and Senoi (Sakai); it is from this stock that the Dravidians have probably diverged on the one hand, and the Australians on the other.] At a later period, when the two parts of the continent were joined, the two groups mixed, and the western Australians overran the eastern portion, mixing with, destroying, and assimilating the inhabitants. In the south, the Tasmanians were untouched by this invasion, and later they were further protected by the formation of Bass's strait." Parkinson thus makes Australia inhabited by man in the Tertiary period! But perhaps it is not fair to take his theory too seriously. Prof. Gregory is of opinion that man penetrated into Victoria only some three hundred years ago.

The work is so full of careful, first-hand information of great value, that one would like the last word of this notice to be one of praise rather than of criticism.

A. C. H.

Australia and New Zealand.

'Stanford's Compendium of Geography and Travel.' (New issue.) Australasia. Vol. 1. 'Australia and New Zealand.' By J. W. Gregory. Second edition, re-written. London: Stanford. 1907. *Maps and Illustrations. Price* 15*s.*

The previous edition of this work was written in 1893 by A. R. Wallace. The old work contained 14 maps and 69 illustrations, and the new work contains 33 maps and 80 illustrations. There are 15 chapters and 505 pages in the old book, and there are 17 chapters and 657 pages in the new book.

It may be pointed out that the geological and ethnological chapters had to be re-written. It is unnecessary to say that Prof. Gregory's geological chapters are minute, laborious, and ingenious; that geology holds the key to physical geography; and that physical geography is the chief thing with which geographical students have to do. Prof. Gregory's characterizations of the "Great Dividing range" of eastern Australia as "highlands" and "dissected plateaus," and of Lake

Keilambeit and its fellows as "volcanic caldrons" are admirable. Geology also throws the only light on subterranean geography, and Prof. Gregory's indictment of the view that artesian water is practically inexhaustible is already familiar to readers of his 'Dead Heart of Australia,' and is elaborated with further and more cogent details. His appreciation of the subtle Archæan and Lower Palæozoic mountain lines, which run from west to east across South Australia, shows originality and insight. Students are often puzzled by the different nomenclatures adopted by the geologists of the different states, and Prof. Gregory is attempting, probably for the first time, to grapple with the difficult task of reconciling systems which differ more in name than in essence; and we agree with his wise doubts as to the occurrence of "Glossopteris" in Queensland sandstone, and with his convincing arguments that dingoes existed before man existed in Australia, although these are matters which have given rise to considerable controversies. He believes, and we think rightly, that the Australian aborigines are a pure race, and his chapters on Australian and Tasmanian aborigines combine mature knowledge with a sound judgment, which is independent of the authorities from which his knowledge is derived. The rest of the animal kingdom as it exists in Australia is adequately described, new light being thrown on Pelorus Jack; and the vegetable kingdom is fairly described, although some references, for instance to those ambiguous vegetables, the Australian "spinifex" and "tea tree," and to the so-called "tropical character" (p. 300) of north-eastern New South Wales, surely require further explanation. Prof. Gregory states that "the first settlements were on the coast at Botany Bay and in Port Jackson" (p. 276), and that "no other expedition" after 1870, "dependent on horse transport, has ever again crossed Australia from west to east" (p. 75), and he writes of the abandonment of the early settlement at Gladstone as though Gladstone were in the northern territory of South Australia, quoting as his authority "Hogan, J. P., 'The Gladstone Colony: an Unwritten Chapter of Australian History' (London, 1898), pp. vi. and 278." These three statements are elementary errors. There never was a settlement at Botany Bay. Sir J. Forrest's famous traverse from west to east in 1874 depended on horse transport solely and exclusively; and the early settlement at Gladstone was on the east coast of Queensland, 1000 miles away from the coast of northern territory, as any one of the 284 pages of Mr. Hogan's book would have informed Prof. Gregory. But the work is primarily a work, not of geology or history or biology, but, like its predecessor, of geography, and it is by its geographical merits or demerits that it must stand or fall.

There are a few small points to which attention might be called. Of New South Wales he writes that "the State is divided into thirteen districts" (p. 320), but does not enumerate them. Turning to the old book, we read (p. 241) of thirteen pastoral districts outside the original twenty counties of New South Wales. Prof. Gregory has apparently mistaken a former subdivision of the unsettled parts of New South Wales for a present subdivision of the whole of New South Wales. Again, is Arnhem Land, in northern territory, 4000 feet high? (p. 98). Has Perth 83 inches of rain? (p. 193). Is Mount Torlesse *east* of Christchurch? (p. 597). Is Dunolly in the southern end or, as his map suggests, on the east of the Pyrenees? (p. 444). Or are these statements misprints? Again, he writes of Australia that its "political divisions are separated by well-marked natural boundaries" (p. 84). Apart from the oddity of including lines of latitude and longitude under the expression "natural boundaries," the reader may well ask, how about the north boundary of the political division called Queensland? This boundary, it will be remembered, is so drawn as to include islets some 60 miles north of the Australian continent, and within 1 or 2 miles of

New Guinea. The only answer is found on p. 348, where the southern, western, and eastern boundaries of Queensland are defined; but no northern boundary is even referred to. Wallace's book contained useful lists of provinces, counties, towns, and the like. Prof. Gregory's book alludes to some of the provinces of New Zealand, without explaining what the allusion means; omits the lists of counties —the omission is more or less justifiable—and in abbreviating the lists of towns excludes Grafton in New South Wales, while it includes Wingen in the same State, which has "one store and two wine-shops," according to Gordon and Gotch; and includes Ashhurst (New Zealand), whose population is stated at 300, while it excludes the former capitals of the provinces of Marlborough and Westland. His selections from the old list are capricious, and do not always ensure the survival of the fittest. Nomenclature and the spelling of names are very small matters, and there is much variety of usage in these matters among writers of acknowledged authority. Western Australia, which was called West Australia in the recent edition of the 'Encyclopædia Britannica,' is now represented by its nickname Westralia. This, though undignified, may pass, for we know what is meant; but surely it is most perplexing to spell less familiar names differently on different pages. Thus Condobolla and Condoublin (Condobolin?), Cudgewa and Cudgewong, Yingellee and Yingellic, Yunee and Jewnee, Raukumara, Raukamara, and Raukaumara, Woolamai and Wollamai, are distracting instances of carelessness. In spite of these small shortcomings the book deserves to be regarded as the standard work on Australian geography, of which the author is an original and at the same time a safe and trustworthy exponent. He grasps the whole subject with a masterly hand. J. D. R.

POLAR REGIONS.

Arctic Researches.

'The Ziegler Polar Expedition, 1903–1905, Anthony Fiala, Commander. Scientific Results obtained under the direction of William J. Peters, representative of the National Geographic Society in charge of Scientific Work.' Edited by John A. Fleming. Published under the auspices of the National Geographic Society by the estate of William Ziegler. Washington, D.C.: 1907. Pp. 630.

The observations recorded here include magnetic observations, notes and sketches of the Aurora Borealis, and meteorological and astronomical and tidal records. Owing to the loss of the ship, much time was occupied in erecting winter quarters, in transporting coal and provisions, etc., and many lines of research had to be abandoned for want of sufficient observers and of complete instrumental outfits. For the latter reason, no records are given of relative humidity, vapour pressure, or dew point. Meteorological and tidal observations were taken at Teplitz bay, Rudolf island, and at Cape Flora; magnetic at Teplitz bay and Alger island. The tide appears to reach Franz Josef Land by two channels—one between Norway and Spitsbergen, and the other between Spitsbergen and Greenland, the tide-wave through the latter reaching the northern part of the group four hours before the southern wave reaches Cape Flora. No discoveries were made in the flora of the islands. Ptarmigan were seen for the first time, and several were shot at Teplitz bay, on Alger island, and Rubini rock. The pair collected on Alger island were the Spitsbergen ptarmigan (*Lagopus hyperboreus*), and probably were blown over from that island. Maps compiled from the observations of the expedition, and from those of former explorers, accompany the report. De Long fiord was found to be only a bay; Booth, Rhodes, and Brown fjords are channels dividing Payer's Zichy Land into separate islands; and Richthofen peak is situated on Alger island. Measurements of a glacier to the

south of Rubini rock, Hooker island, are interesting as the only definite information on ice-movement in the archipelago. The foot of the glacier was advancing into the bay at the rate of about a foot a day. As the season was midsummer, with temperatures of 32° to 42° Fahr., the movement was probably at its maximum.

GENERAL.

Some Remote Islands.

'Three Voyages of a Naturalist.' By M. I. Nicoll. With an Introduction by the Right Hon. the Earl of Crawford. London: Witherby & Co. 1908. *Price 7s. 6d. net.*

The author gives some account of three voyages on the R.Y.S. *Valhalla*, during which he visited such interesting and little-known islands as St. Paul's rocks, Fernando de Noronha, South Trinidad, Tristan da Cunha—all in the Atlantic ocean—Gloriosa, Assumption, and Aldabra in the Indian, and Easter and Pitcairn islands in the South Pacific.

For the most part the book consists of a record of the birds which the author sees and shoots, with scanty notes and observations on their nesting and habits. Of the islands visited there is no attempt to give an account from any aspect except that of birds, while the latter are recorded as seen or shot for each island by itself without any consideration of how they got there, or why they have continued to exist there, or of their particular relationship to their environment. The best account is of South Trinidad, on which the dead trunks of a forest of trees, apparently "acacia," were found, often making progression difficult. They appear to have been almost killed out in recent years, being replaced in parts by a jungle of tree ferns. Aldabra is another island of great interest for its indigenous birds and land tortoises, but our author's time there was curtailed by difficulty in getting ashore at low tide and by rain. Incidentally its lagoon is stated to be 30 miles across, while the maximum length of the island is 19 miles on the Admiralty chart, a sample of a very conspicuous lack of accuracy throughout the whole book.

Mr. Nicoll appears to us to be an excellent collector of birds, though his book shows a lack of that geographical feeling which one almost demands of an author-voyager to such interesting lands.

SHORT NOTICES.

Europe.—'Fynes Moryson's Itinerary.' (Glasgow: Maclehose. 1907. Four vols., pp. xv., 466; vii., 466; vii., 499; ix., 521. *Maps and Illustr.* 50*s.*) Like other issues from the same house, this is a simple and excellent reprint. Save for a brief publisher's note, including a biography of Moryson, the edition is without commentary; only trivial textual alterations (such as the correction of printers' errors) have been made, together with references to the pages of the original edition. An index, however, has been supplied; this is well, for it was a necessity which the original did not supply; the place-names quoted in it are not always (though generally) spelled conformably to modern usage. Some of the old maps (for example, the perspective of the "cittie of Limerick") are highly interesting.

Asia.—'Ceylon, the Paradise of Adam.' By Caroline Corner. (London: John Lane. 1908. Pp. xiv., 324. *Illustr.* 10*s.* 6*d. net.*) This is a purely personal "record of seven years' residence" in Ceylon. It is, in some degree, distinguished among similar works by the sinking of the writer's individuality in the use of the third person, and in the large amount of conversation quoted—principally between the heroine (if the term may be used) and servants, and other natives, which adds to the interest by demonstrating their character. Many scenes and incidents, picturesque or exciting, are vividly described.

THE MONTHLY RECORD.

EUROPE.

The Forest Populations of Central France, in Morvand, Bas Nivernais, and Puisaye, are the subject of a recent monograph, forming one of the series entitled 'La Science Sociale,' and edited by M. E. Demolins. Morvand is an isolated massif 55 miles long and 25 wide. It lies in the zone of humidity which is characterized by great forests of oak, beech, and elm. The soil is granitic, and cultivation is carried on only in a few favoured spots. The watercourses which flow from the plateau bear large quantities of floating timber to Paris. This is used for fuel only, and the industry is only in the elementary stage, while changes in methods of heating have caused depression. On this account the people are forced to emigrate to Paris and the large towns, the men obtaining work as harvesters and carters, the women as nurses. It is pointed out that the old system of family life was well adapted to this region when the inhabitants lived directly on the products of an extensive cultivation supported by pastoral activity. It declined when the cultivation became more intensive and allowed the sale of excess products. It disappeared when production was completely commercialized, and forced the population to procure its sustenance from outside. The next area, Bas Nivernais, is a limestone plateau, dissected and broken. Le Bazois is a typical district of meadows and woodland, in which cattle rearing and forestry are the principal occupations. Cultivation is carried on on a large scale, and the metayage system has disappeared. Deposits of iron, lead, and oil are worked industrially, the workmen forming close corporations in which the son takes the place of the father. Kaolin is found, and gives rise to an earthenware industry at Nevers. The introduction of machinery has increased profits, wages, and production, but also antagonism between master and workman, and social disorder. Increased use of iron in building construction, change in fuel, and foreign competition have depressed the timber trade. The woodcutters have formed associations, but industrial development has disintegrated the family. With the development of communications La Puisaye has improved its silicious and clayey soil by lime, marl, and chemical manures. Intensive cultivation is carried on in "artificial" fields, wheat being the chief cereal. Iron and earthenware industries have languished, while the forests are further being exploited for building purposes. Luxury and factitious needs are sapping the energy of the people and diminishing the birth-rate. The men emigrate to Paris to find service under the State, while the women obtain employment as nurses.

The Geographical Element in the Roman Road System is elucidated in an article, illustrated by a map of the Roman roads in Austria, by Prof. O. Jauker, of Laibach, in the *Geographischer Anzeiger* (vol. 9, No. 4). The practical science with which the Roman roads accommodated themselves to the geography of the lands they traversed may be inferred from the fact that the main highways of Europe still follow the Roman lines, and that where, for short distances, modern roads deviate from the Roman, it is in most cases not to their advantage. Though a scheme of the Roman roads is no longer producible in full, an idea of their range and ramification is suggested by the marvellous network recently discovered by Ballif in the most inhospitable part of Herzegovina, where the Roman tracks have not yet been obliterated by later culture. In the Roman roads may still be read the shifting of centres and lines of operation from the coast to the Save, and thence to the Alps and the Danube, while the records of the mile-stones enable us to ascertain whether at the respective dates Rome was in communication with Germany, the Alps, or

Pannonia. Chief among the geographical factors not influenced by, but powerfully influencing, Roman history is the great chain of the Alps, which opposed a formidable barrier to foreign invasions, and imposed a salutary check on rash extension of Roman dominion beyond them. To the west is a series of great mountain masses, penetrated by some deeply cut valleys or mountain passes over 6000 feet high. It was, however, very late before the Romans carved out roads along these lines. They preferred circumventing the Alps by following the Julian road along the sea-coast. To the east is a succession of chains lower and more practicable. Yet it was not till the tide of Roman conquest assailed Pannonia and Bohemia that the passage of the eastern Alps became of urgent importance. Tracing out the east Alpine and Karst roads, the author shows how far they were determined by the morphology of the respective regions. As an illustration of the excellence of the Roman alignment, the article gives lists of places united by roads radiating from Verona and Aquileia, and of places at the extremities united by peripheric roads.

The Geography of the Sundgau.—A sketch of the geography, physical and anthropological, of the Alsatian district known as the Sundgau, is given by Herr Tschaeche in the *Deutsche Rundschau* (vol. 30, No. 7). In historic times the name —a corruption probably of Südgau (south country), in contradistinction to Nordgau— covers very fluctuating areas of land, and seems still used with much laxity of application. Treating the Sundgau as a geographically distinct unity, viz. the preglacial depression uniting the upper Rhine trough with the Rhone depression, the article restricts the name to the undulating land stretching from the Jura to the Vosges and the Doller valley, bounded on the west by the frontier line, and falling off eastwards rather steeply to the Rhine plain. At its northern edge the land rises to about 900 feet; in the south to over 1400 feet. Sloping from east to west, its greatest elevation on the east is not very considerable. The valley formation is peculiar. The Ill, Larg, and Hundsbach creep along listlessly in valleys of a breadth such as, in their present scanty condition, the rivulets could never have scooped out for themselves. Spacious dry valleys, in which young valley formations lie embedded, are a feature of the Sundgau, and their formation is traced to the waters of the ice-age. Everywhere abundantly watered, the Sundgau is adorned with numerous lakes laid out "like strings of pearls." The climate is highly favourable, and flora and fauna are of great range and many species. Fruit is so plentiful as to be largely distilled into spirits. The luxuriant meadows yield excellent fodder for cattle, which are raised in great numbers. There is abundance of limestone, clay, marl, and sand, but practically no minerals of economic value. In every larger village there is a small brickfield. Recently great cotton-spinning and weaving factories have been erected, and the large farmers (mostly Anabaptists) have had to bring Polacks as field labourers from Galicia, and herdsmen and milkers from Switzerland to supply the drainage of hands caused by the factories. Numerous Italians and French complete the tale of the inhabitants. With an area of 380 square miles, the Sundgau has a population of about 265 to the square mile. The article gives a lively picture of the natives driving their cattle to market, and of their buying and selling. The tall and sinewy frames of the peasantry of the Ill and upper Larg contrast with the thick-set but lively and talkative inhabitants of the southern part of Dammerkirch canton. The Sundgauer proper is described as upright, industrious, and frugal.

ASIA.

Indian Surveys in 1905–06.—The 'Extracts from narrative reports of officers of the Survey of India for the season 1905–06' are mainly occupied with more or

less technical matter, only the last item dealing with work of more general geographical interest. This has to do with survey work in the southern Shan States, carried out by a party under Lieut. R. H. Phillimore, R.E. The Kengtung State, which formed the principal field of operations, extends on both sides of the Salwin-Mekong divide (here formed by a lofty meridional range rising, in Loi Hpalan, to a height of 7626 feet), though more than half falls within the Mekong basin. The country is mountainous and broken, both ranges and river-valleys running generally north and south. On the Salwin side the principal rivers are the Nam Ping and Nam Hsim, the latter being the more important, and navigable in part. The valleys of both are generally narrow, and the sides are in great part wooded, though in places bare and rocky. The higher hills are covered with pine trees, but their slopes are gradual. Mules can cross the two ranges in several places, and there are foot tracks over many of the hills. The Nam Ping valley and the upper valley of the Nam Hsin are thickly populated by Shans, while the hills are occupied by various hill tribes—sturdy, efficient men—who do not descend below 4000 feet. On the Mekong side of the watershed are the capital of Kengtung and the only plain of any extent within its limits. Kengtung is a walled city of $4\frac{1}{2}$ miles perimeter, with a population in 1901 of 6000. Its bazaar is the finest in the Southern Shan States. To the north lies a wide and densely populated plain, some 2600 feet in altitude. It is somewhat marshy, and unhealthy for Europeans during the rains. Throughout the area surveyed mists and haze seriously obstructed the surveys. During December and January mist hangs in the morning over every river and stream below 3500 feet, while in March the hill fires begin and help to produce a haze which grows thicker and thicker until the rains break. The first report in the volume gives a detailed account of the magnetic survey operations during 1905–06, with a summary of the present position, while the second describes pendulum operations undertaken, among other objects, with a view to ascertaining whether the deficiency in the force of gravity observed in the outer Himalayan zone near Dehra Dun and Darjiling would also be found near Simla. This proved to be the case, the deficiency proving to be of the same order of magnitude as at Mussuri. The operations extended as far west as Quetta, and among other results was the discovery that the observed value of g at Jacobabad was largely in excess of the computed value. A similar excess had been found in the plains of Bengal during the previous year.

A German Gunboat on the Upper Yangtse.—We learn from the *Geographische Zeitschrift* (1908, No. 4) that a voyage up the Yangtse above the rapids of the middle course of the river, almost to the limit of navigation at the foot of the Tibetan highlands, was made last year by the German gunboat *Vaterland*, commanded by Captain Toussaint. This was the first occasion on which the German flag had been displayed at Chungking. During the voyage especial attention was given to the charting of the rapids, and Captain Toussaint's report, published in the *Marine Rundschau* for February, 1908, is accompanied by a map on which the most dangerous rapids, with their rocks, shallows, etc., are laid down. The highest point reached was Suichou-fu at the mouth of the Min.

Investigations in Hainan.—M. Madrolle, who some years ago did some exploring work in Hainan, has undertaken a new expedition, which has the support of the Paris Geographical Society. His plans include both a study of the part of the island under Chinese influence and a visit to the central *massif*. Writing in December last to the Paris Society (*La Géographie*, vol. 17, p. 329), the traveller announced that he had reached Lea-mui, the last Chinese post, and was thence making a preliminary study of the aboriginal country in the centre of the island, the summits of which are in clear weather well seen from Lea-mui. A few days

later he reported to the Comité de l'Asie Française, which also supports the undertaking, that he had penetrated into the mountains, where he found himself in the midst of a wild, though not hostile, population.

AFRICA.

French Exploration north of Lake Chad.—A recent journey by Lieut. Ayasse from Ngigmi on Lake Chad to Agadem and Bilma is described in the issue of *La Géographie* for February last, which also contains notes by Captain Freydenberg on the geological results of the trip, together with a geological sketch-map of the region traversed. North of Ngigmi there are sandhills from which one can see Lake Chad, and thence to the oasis of Agadem the desert intervenes. Northwards again one has to cross a succession of sandhills between which lie long and narrow depressions. The passes through which the caravan had to make its way were not always easily discovered, and advance was naturally difficult. Bilma, the terminus of the trip, contains three salt-pits, whence salt is carried away in all directions in 25,000 camel-loads a year. It is consumed by the tribes to the south, and by the Tawarek and nomads of the Sahara. The rock specimens brought back have settled some interesting points in Central African geography. They show what was the greatest extension of Lake Chad—to Ngurti—and throw light on the two volcanic zones of Beduaram and Agadem, as well as on the granitic chain of the region north of Chad. The quartzites and laterites show that vulcanism extended beyond the limited areas at Beduaram and Agadem. The period of outflow was of long duration, and the eruptions must have been intense. The salt pits of Bilma and the presence of sodium show that a sea or lagoon covered the whole region. Of neolithic remains there are various stone implements—polished scrapers and arrow-heads. Axes and knives were obtained simply by polishing and rubbing pebbles. Traces of a regular industry are to be seen in the axe-heads of the south, while the arrow-heads of the Sahara tell a tale of nomad marauders.

The Relative Levels of the Victoria and Albert Nyanzas.—The fact that the difference in altitude between these two lakes had been determined by a line of levels was reported by Captain Behrens in a communication to the *Journal* for August, 1907, on the authority of Mr. R. C. Allen, chief surveyor for the Uganda Protectorate. We have since received further details from Mr. Allen, who in a memorandum on the subject describes the steps by which the final results (as regards the altitude of the Albert lake) were obtained. It appears that the difference in level between the zeros of the gauges at Entebbe and at Butiaba on the Albert Nyanza was obtained in 1905 by Mr. E. Richardson of the Uganda survey, by spirit-levelling (single, in one direction), the result obtained being 1690·66 feet. Assuming (as in Captain Behrens' paper in the *Journal* for March, 1907) that the zero of the lake gauge at Port Florence is 3720·15 feet above mean sea-level at Mombasa, and making the necessary allowances for the difference between the zeros of the Port Florence and Entebbe gauges, and for the level of the lakes above the zeros of the gauges, Mr. Allen finds that the mean altitude of the water-level of Lake Victoria was, in 1905–6, 3721·75 feet, and the (absolute) height of the water-level of the Albert-Nyanza, in July, 1905, 2029·48 feet. The difference in the level of the lakes has also been obtained, independently, by two other operations, the results showing a most satisfactory agreement. In 1907, a party of the Egyptian Survey Department, adopting the plan of double-levelling by two men in one direction, and comparing the results at regular intervals, obtained the value of 1690·59 feet for the difference between the zeros of the Butiaba and Entebbe gauges, while the same difference came out as 1690·20 feet as the result of trigonometrical levelling by the Uganda

Survey Department in the same year. As Mr. Allen remarks, this is a striking proof of the degree of accuracy obtainable by trigonometrical levelling.

Journeys in the North-east of the Uganda Protectorate.—Mr. H. A. C. Darley sends us a brief account of a trip made by him during the present year in the region between Lake Rudolf and the Nile. From a base camp near Marangole (see Major Powell-Cotton's map in *Geogr. Journal*, July, 1904, or that by members of the East African Syndicate, *ibid.*, May, 1905) he went south by the ordinary route to Magosi, and thence to the Tarash river. Crossing this, he pushed as far as Laramet, returning *viâ* the Turkwel, the northern side of Mount Moroto, Jiwe, and Dodosi. The Tarash rises on the northern, not the eastern, side of the range shown on the maps as the Murosoka hills, but of which, Mr. Darley says, the correct name is Loima, Moru Sokar being a largish hill on the western side, between which and the main range the Tarash issues through a narrow gap. This river runs, as was stated by Major Powell-Cotton, to a big swamp which only holds water during the rains. Close to the swamp are some water-holes, the water being apparently of a dangerous nature, for the country for miles round is covered with elephant bones, and both natives and traders say that if these animals drink the water they die. Mr. Darley secured a sample for analysis. The swamp is called Lakiboro, and receives two other rivers during the rains—one from Zunot, called Nanam; the other from Loniro, called Lolniro. Mr. Darley proposed to go on from Mbale to the Toposa* (with whom he was on friendly terms, though they had recently killed three hundred Swahili), possibly afterwards proceeding to Rotilla. The people about Mbale talk the same language as the Turkana, it being largely founded on Masai, though they prefix the letter *y* to their nouns.

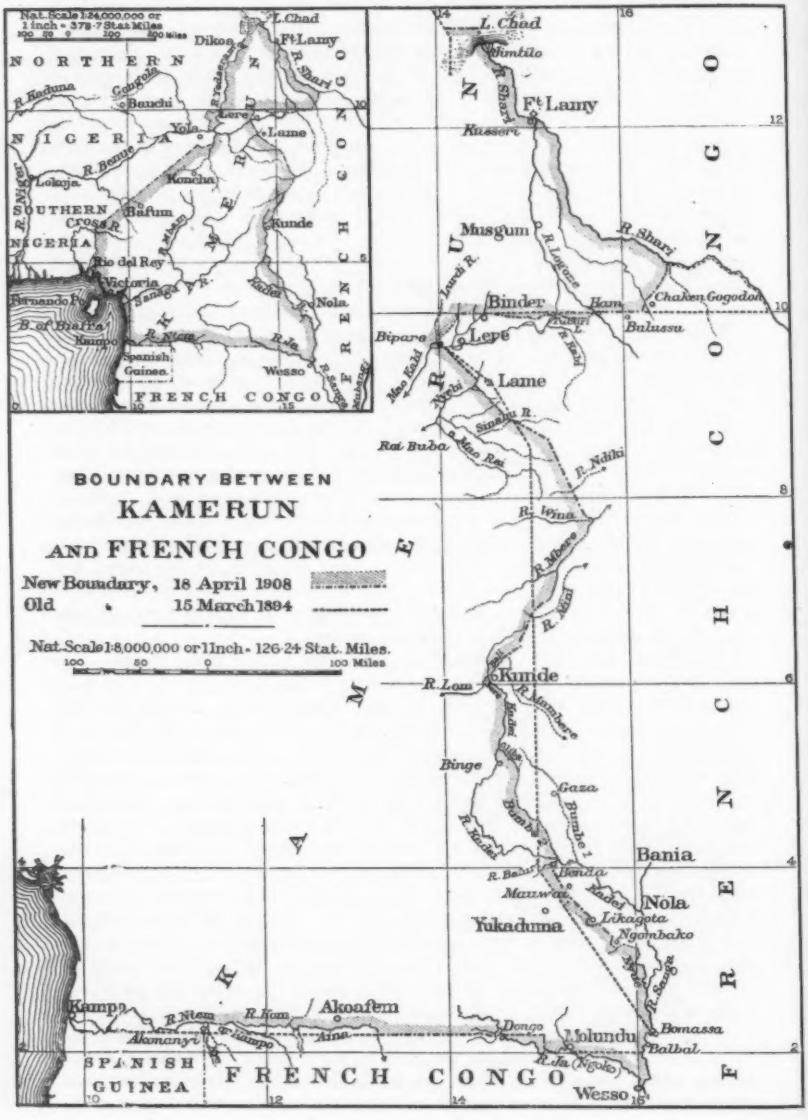
The Duke of Mecklenburg's Expedition in Equatorial Africa.—Further instalments of the Duke's report on the course of his expedition (*Journal*, vol. 31, p. 445) have been printed in the *Deutsches Kolonialblatt* (1908, Nos. 7, 9, and 12). They show that the scientific work of the expedition is being carried on with much energy, and that the labours of the various experts attached to it are likely to yield an unusually rich harvest of results. After completing their researches in the neighbourhood of Lake Kivu, the Duke and his party went northward in several detachments to the Albert Edward lake, continuing their march through the Semliki valley and by the shores of the Albert Nyanza to Mahagi, whence a westward route to the Congo State stations of Kilo and Irumu was taken. Separate expeditions were also made from time to time on one side or another of the direct route. Among the most interesting of these was one carried out by the Duke in company with Dr. von Raven and the head of the mission-station of Nyundo, to the little-known forest of Bugoie, east of Lake Kivu, in which the existence of the gorilla had been reported by the natives. After some trouble several specimens were secured, the first seen by a European in this district, though one or two specimens of a species named *Gorilla Behringei* at the Berlin Zoological Museum (with which that from the Bugoie forest would seem to be identical) had been previously obtained from the neighbourhood of the volcanoes to the north. Another interesting excursion was that to the most westerly of these volcanoes, Namlagira, which was ascended (for the first time from the south) by the Duke and several of his companions, including Dr. Kirchstein, the geologist of the party. It is the only one of the volcanoes at present in full activity, and the route led over a wide lava-field, due to the eruption of a parasitic crater in 1904. Dr. Kirchstein was witness, during his extended researches on this volcano, of a number of eruptions from the main crater, which is of very large size (some 3 miles

* Dabossa of the East African Syndicate map.

in circumference). They took the form of discharges of ashes and lapilli, accompanied by loud detonations and discharges of gas. He was able on one occasion to descend a portion of the inner crater wall, and also discovered on the south side of the mountain a series of "embryonic volcanoes," as a similar phenomenon in Swabia has been named by Prof. Branco. During the march to the Albert Edward lake, over the Ruchuru plain, extraordinary quantities of game were seen, and the zoological collections received important accessions. They may be expected to throw valuable light on the various forms exhibited by many of the species in different districts of Africa, the buffaloes especially showing certain differences from those obtained elsewhere. From Beni, the important Congolese post in the Semliki valley, an expedition was made into the forest to the west, which exhibited quite a different flora from that hitherto met with. Some of the Monbutta pygmies were obtained as guides, and though they had not before been in touch with Europeans, they proved quick at taking in new ideas. Their colour was remarkably light. Information was here obtained of an animal named soli, which from the accounts appeared to resemble the okapi (also called kwapi), but which was said to possess an upright horn. A skeleton was subsequently obtained on the Ituri, and it is said to be an antelope with transverse stripes on the back, and with horns resembling those of the bush-buck, though of the size of an eland's. Information was also obtained in the forest which seemed to indicate the existence of an unusually small form of elephant. An expedition up the Butagu valley to the point on the slopes of Ruwenzori reached by Stuhlmann (and since by various other travellers) was made by Drs. Schubotz and Mildbraed (zoologist and botanist respectively), which considerably enriched the collections. Reports by these experts on the general results of the expedition from the point of view of biological distribution are printed in the latest issue of the *Mitteilungen a. d. Deutschen Schutzgebieten* (No. 2, 1908), to which we hope to recur later. It also contains the report by the topographer, Lieut. Weiss, who carried out valuable surveys until unfortunately invalided home. Another member of the party, Dr. von Raven, was also obliged to give up his part in the expedition, owing to injuries received from a buffalo. The latest communication from the Duke gives some particulars of the gold-mining operations at Kilo, in Congolese territory.

The New Boundary between the Kamerun and French Congo.—The accompanying sketch-map shows this boundary as laid down by the agreement signed at Berlin on April 18, 1908, by the German foreign secretary and the French ambassador. This agreement confirmed the protocol signed on the 9th of the same month by a joint commission of experts representing the two countries. The text of the agreement (embodying the above-mentioned protocol) is printed in the *Deutsches Kolonialblatt* for May 1, 1908, in which is also given a reduction of the official large-scale map by Max Moisel attached to the agreement. It will be seen that the new boundary deviates to a considerable extent from that laid down by the agreement of March 15, 1904, which consisted largely of conventional lines, while the new frontier is determined as far as possible by the courses of rivers or other natural features. It has been arrived at by a series of mutual concessions, each power having given up portions of territory at certain parts of the frontier, and received accessions at others. The towns of Kunde and Lame remain French, as provided by the old agreement; and in order to permit this in the case of Kunde a considerable area west of 15° E. is handed over to France, who also takes over a portion of the wedge of German territory which ran east between the Shari and 10° S., causing an exaggerated and unnatural zigzag in the former frontier. France likewise retains possession of Bipare, near the head of navigation on the Mao Kabi (Mayo Kebi), as to the exact position of which (on one side or the other of the

frontier) some controversy arose after Captain Lenfant's exploration of the water-route from the Benue to the Shari. Germany's principal gains are between 9° and 7° S., and in the extreme south-east corner of the Kamerun. Where the line cannot follow



a river, it is formed, as a rule, by straight lines joining specified points, such as fords on the rivers, or points defined by geographical co-ordinates. In Lake Chad the boundary runs from the main mouth of the Shari to the intersection of the meridian of 14° 28′ E. of Greenwich with the parallel of 13° 5′ N. Apart from the definition of the boundary, the agreement provides for the freedom of navigation on the waters of the Benue, Shari, Logone, and their affluents, within the respective territories, as well as on the Congo and on the Sangha and its affluents. Equal rights as regards the use of land communications are also accorded to the subjects of both powers in the portions of the basins of the Benue, Shari, and Logone falling within their territories, as also in the portion of French territory south of 13° S.; and this provision is also extended to include the route from Yola through Ngaundere, Kunde, Gaza, to Bania. The demarcation on the spot is to begin within four months of the ratification of the convention, and provision is made for the settlement of any difficulties which may occur in the process.

AMERICA.

Inland Waterways of the United States.—In the April number of the *Popular Science Monthly* for the present year, Dr. McGee discusses the inland waterways of the United States, with especial reference to the recent agitation for their improvement and further development. In 1787 a Convention was held at Philadelphia to discuss the inter-state management of the Potomac. Washington planned a canal to connect the tide-water region with the virgin Ohio country; Dewitt Clinton foreshadowed the Erie canal; Gallatin outlined a plan for national waterway improvement and commercial development. The growth of railroads during the nineteenth century caused these plans to remain undeveloped or in abeyance. The canals were almost all controlled by railroad corporations, and river traffic came to an end. All the while, however, production and population were outpassing the capacity of the railroads. In 1906, as the result of widespread desire for action, a Waterways Commission was appointed. All the possible waterways were studied by the commission itself and numerous independent conferences. The most pressing need was for navigation and carriage of freight. Although water-carriage involved only one-third the expense of that by rail, and one-ninth of the freight-lines were waterways, only one-twelfth of the commodities were carried by water. Production began to be checked because commodities could not be carried away. The suggestions made, therefore, are for a deep channel between the lakes and the gulf; an inner passage from Massachusetts to Florida; a canal from Minnesota and the Red river to Hudson bay through the grain-fields of Canada; and the opening up by waterways of the Pacific region, use being made of the Columbia, Snake, and Colorado rivers. The value of land is chiefly determined by the water on or in its substance; and it is estimated that 150 million acres of swamp and desert could be reclaimed, and be settled by 20 million people. The water-power capable of utilization is infinite. What is needed is that some one should act in the public interest.

Mining in Minas Geraes.—A Consular Report (Miscellaneous Series, No. 667) gives a detailed account of the mining industry in the state of Minas Geraes, which, with an area of 221,894 square miles, has a population of about 4,000,000. Its known minerals include gold, diamonds, precious stones, manganese, iron, cinnabar, platinum, galena, graphite, etc. A considerable section of the auriferous region, extending from Bahia to Goyaz, lies within the state. Gold is found in alluvial deposits and in veins and rocks. After assaying thousands of samples, a well-known authority concludes that the ore bodies are of a low grade, but profitably workable if the cost of mining were lower. The climate in the interior is

good. The temperature ranges from 56° to 82°. The rainy season is from November to March. The rainfall in 1903 was 49; in 1904, 58; and in 1905, 60 inches. Yet on the whole public health is not good. Tuberculosis, typhoid, and other diseases are favoured by the habits of the natives. The Morro Velho, the deepest gold-mine in the world, has been worked since 1830. In 1886 the mine caved in, but was re-opened in 1889, the lode being now intersected at a depth of 4264 feet. The Passagem mine, with the Borges and Santa Anna lodes, has been continuously worked since 1884. Eighty-three tons of ore from the Santa Anna mine yielded gold of the value of £252. The Brazilian diamonds are rivalled only by Indian. The best are found at Bagagem, Agua Suja, in the north-west; next come those of Diamantina, a deposit comprising a belt of country 120 miles by 12 to 20, including the basins of the Jequitinhonha, Doce, and San Francisco rivers. A railway is in course of construction to connect Diamantina with Victoria port. At Agua Suja was found the famous "Star of the south" diamond. On the Rio Doce malaria prevails. The Miguel Burnier manganese deposits, discovered in 1888, and worked since 1893, are situated close to the Central railway, on the Ouro Preto branch line, 313 miles from Rio de Janeiro. The Morro da Mina, in Queluz district, is said to be the largest manganese deposit in the world. A Government Geological Commission is about to investigate the mineral resources of Brazil. Capable of ranking as one of the chief mineral producers of the world, Brazil's present mineral export falls short of two per cent. of its total export.

AUSTRALASIA AND PACIFIC ISLANDS.

Orography of Victoria.—The highlands and main divide of Western Victoria form the subject of a monograph by Mr. T. S. Hart, F.G.S., in the *Proceedings of the Royal Society of Victoria* (vol. 20 N.S., part 2). This region forms an area occupied mostly by ancient rocks between the north-western and south-western plains. The line of division between the north and south flowing streams is spoken of as the main divide or dividing range. This barrier was used in the early days of the colony as an administrative boundary, but there was much dispute as to its right to the name it bears. Yet there is a greater difference between the animals and plants of Victoria, north and south of the range, than between the animals and plants of South Victoria and Tasmania. This seems to point to the fact that the divide is older than Bass strait. Biologically it obstructs the migration of plants and animals, and the climatic difference further affects their distribution. The easiest passes through the massifs are used as trade routes. The western highlands form a mass of Ordovician rocks, which are overlain by fluviatile and volcanic deposits. The general appearance of the region is that of a deeply dissected plateau. The upper rocks lie unconformably upon those underlying, and thus show that the morphology of their surface is due to excavation from above, not to accumulation from below. The volcanic plains were subsequent to the elevation and partial dissection of the peneplain. The valleys of the highlands run on the whole from north to south. The railway thus follows a switchback course, frequently rising to a height of 1100 to 1300 feet, as when it crosses the Grampians near Mount Ararat. The line of divide has been affected in direction by the lava intrusions and the work of river capture. The clue to the cause of the early divide is to be found in the movements of elevated and tilted fault blocks. These can be seen in profile. The valleys were formed primarily by faults, which allowed a succession of ranges to be formed from the same beds. To sum up, the dividing range consists of the unequal block elevations of a Mesozoic or Early Tertiary peneplain. This has been subsequently and extensively modified by volcanic activity and subaërial denudation.

A Hamburg Expedition to the Pacific.—An expedition for ethnological research in the Pacific has, as we learn from *Globus*, been organized by the Hamburgischer Wissenschaftliche Stiftung, under the direction of Prof. Thilenius, director of the Hamburg Ethnological Museum, who is himself known for investigations in the same field. In order to make the expedition independent as regards its means of locomotion, the *Peiho*, a steamer belonging to the Hamburg-American line, has been chartered and fitted out with all appliances for the proposed research. The expedition includes six expert members, its leader being Dr. Fülleborn, whose ethnological investigations in East Africa are well known to geographers. The party sailed in May, and were to reach Hongkong during June, afterwards proceeding to the Bismarck archipelago, where operations will be begun.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Is the Sea-level rising?—The question of the permanence or variability of the level of the sea, relatively to the land as a whole, is one which continues to exercise the minds of geographers. We referred last month (p. 570) to the conclusion of M. Négris, based on a study of ancient buildings on the shores of the Mediterranean, that a distinct rise in the relative level of that sea has taken place within historic times. A similar conclusion has been reached by Prof. Gnirs of Pola, who has himself carried out extensive investigations on the shores of the Mediterranean (particularly its eastern half), and has summarized the results, combined with a limited number due to other observers, in the *Mitteilungen* of the Vienna Geographical Society (1908, Nos. 1 and 2). His observations seem to have been carried out with care, and in basing conclusions on the existing position of ancient buildings, he has taken into consideration (in addition to the date of erection) such factors as the character of the structures and the purposes for which they were intended, the nature of the material used, the geology of the neighbourhood and the possibility of local land-movements, as well as the conditions of currents, etc., in the adjoining sea-areas. He also points out that some evidence may be supplied by an examination of the ground-water level and indications of its variation supplied by wells, etc. He likewise makes use of the data regarding ancient topography (his own special subject) supplied by early historical documents. The general result arrived at is, that throughout the whole region in question we have evidence of an almost universal rise of the sea-level to the extent of nearly 2 metres during the last 2000 years, the few places where it cannot be established being those in which there are indications of local movements of the land. In seeking an explanation of this consistent movement in one direction, Prof. Gnirs (unlike M. Négris, who had recourse to a supposed rise in the sea-floor) points to the evidences of general desiccation and retreat of glaciers at the present day, when we seem to be approaching the climax of an interglacial period; holding that the rise must be due to a corresponding increase in the volume of the sea, and quoting Penck as having shown that the reverse climatic movement during the glacial epoch must have *lowered* the general sea-level by as much as 70 metres (230 feet). A difference of 2 metres in 2000 years means an average yearly rise of 2 mm.—an amount quite capable of demonstration by careful observations extending over a series of years. Such, Prof. Gnirs points out, are available from the hydrographical station at Pola, and he quotes figures showing that a total rise in the sea-level to the extent of 3·20 cm. (1·3 in.) took place in the twenty-nine years from 1875 to 1904. The facts adduced are certainly striking, though many may hesitate to accept the explanation suggested. In view of the great differences known to exist between the levels of the sea in different regions, it would be rash to conclude that a rise demonstrated in any one locality must be universal; and if the Mediterranean

alone be in question, the desiccation of the surrounding region might be supposed rather to lower than to raise its level. Again, it would seem that, in an enclosed sea at least, some part of the result might be due to the transport of material from the land to the sea-floor, while the effect of deforestation in promoting the more rapid discharge of water into the sea might also deserve consideration.

GENERAL.

Geography at Cambridge.—It has been decided to reorganize the teaching of Geography at Cambridge University, in accordance with recommendations made by the Board of Geographical Studies. The existing Readership in Geography, which becomes vacant in the Michaelmas Term of this year, will not be continued, but its place will be taken by three Lectureships in Geography. Two of these will be known as the Royal Geographical Society lectureships, the Society's Council having promised to contribute £200 a year for three years to the Geographical Education Fund. One of these, the lectureship in regional and physical geography, will be in connection with the Special Board for Biology and Geology, while the other, concerned with surveying and cartography, will be in connection with the Special Board for Mathematics. The third lectureship, in historic and economic geography, will be under the Special Board for History and Archæology. We understand that special attention will be given by the General Board of Studies to the co-ordination of the three branches of the subject, and we may therefore hope that its unity will not suffer from the proposed distribution between three separate departments.

Lectureship in Geography at Sheffield.—Mr. R. N. Rudmose Brown, well known for the part which he took in the recent Scottish Antarctic Expedition, and joint author of the narrative of the voyage, has been appointed to the lectureship in geography recently instituted at the University of Sheffield. Mr. Brown, who is a son of the late Dr. Robert Brown, last year carried out, on behalf of the Indian Government, an investigation of the pearl fishery of the little-visited Mergui archipelago, off the coast of Southern Burma.

Memorial to William Dampier.—A suggestion originally made by Mr. W. Clark Russell, that the old navigator, William Dampier, should be commemorated by a memorial in the parish church of his native village, has lately been carried into execution. Dampier's birthplace was East Coker, near Yeovil, and in the ancient church of this Somersetshire village the memorial was unveiled on May 19 by Mrs. Heneage, of Coker Court, a direct descendant of the navigator. It takes the form of a marble slab, bearing a brass plate with inscription recounting Dampier's geographical achievements, together with representations of the vessels and nautical instruments of his time. There is also a medallion portrait of the navigator. The proposal had received the warm support of Sir Clements Markham, who thus once more displayed his interest in the deeds of the old naval worthies, and a contribution to the cost was also made by our Society.

OBITUARY.

Sir John Evans.

Though the late Sir John Evans was not in a strict sense a geographer, his wide interest in all branches of science, and the solid contributions to human geography which have resulted from his archæological researches, entitle him to more than

formal mention in this *Journal*. Born in 1823 at Britwell Court, in Buckinghamshire, and educated privately at home and in Germany, he became associated early in life with the well-known firm of John Dickinson & Co., of Nash Mills, in Hertfordshire, where he lived for more than fifty years, and accumulated the magnificent collection of prehistoric and other antiquities which made him one of the best known of European antiquaries. His earliest archæological study was that of coins. His collection of ancient British coins was one of the finest in the world, and his connection with the Numismatic Society of London, which began in 1849, culminated in his election as president in 1874, and this office he retained till his death. His 'Coins of the Ancient Britons' was first published in 1864, and completed by a supplement in 1890. It introduced order for the first time into a most difficult and obscure department of archæology by the systematic application of scientific methods to the collection and classification of the material, and in particular by emphasizing the importance of the geographical distribution of the places where isolated coins are found, as a guide to their centre of production.

But his best-known contributions to knowledge were in regard to the geological evidence for the earliest history of Mankind, and for the distribution of the first objects of human manufacture. He turned his attention at an early age to the study of geological structure in relation to water-supply, and thus became expert in the interpretation of those superficial deposits in which the earliest works of man were in due course to be detected. It was not without reason, therefore, that he was selected, in 1859, as one of a famous little band of English antiquaries and geologists to visit those gravels of the river Somme, in which Boucher de Perthes was claiming that he had discovered "worked flints," and who, by satisfying themselves of the accuracy of his observations, laid the foundation in England for the scientific study of Palæolithic man. Thirteen years later—in 1872—Evans published an unrivalled work on the 'Ancient Stone Implements, Weapons, and Ornaments of Great Britain,' and a similar volume on 'Ancient Bronze Implements' in 1881. In those two great treatises, he summed up practically the whole of the existing knowledge of these early works of man, and set Early British Archæology on a firm scientific footing.

It is needless to enumerate in detail the distinguished services of Sir John Evans to geology and the study of man. He became president of the Geological Society in 1874, of the Anthropological Institute in 1877, and of the Society of Antiquaries in 1885, and in the latter capacity established, as an *ex officio* trustee of the British Museum, a position in the councils of the Museum which secured his nomination in due course as a permanent trustee, and one of its most active managers. In 1878 he became treasurer of the Royal Society, and in his twenty years' tenure of this office had ample opportunity for the exercise of his high ability as a financier and man of business. In 1879 he presided over the British Association on the occasion of its meeting at Toronto, and was for long an assiduous and highly valued member of its council. He was created K.C.B. in 1892, and was the recipient, in due course, of many complementary degrees and similar distinctions from universities and academies all over the world.

To the rare combination of great business ability and wide and varied scientific interests, Sir John Evans added a high degree of classical scholarship and literary taste; a strong devotion to the district in which he lived, of which he was an able and respected administrator in many capacities; and, above all, a personal charm which endeared him, not merely to the large circle of friends whom he loved to gather in his beautiful museum home, but to the larger world of students of every degree in the subjects nearest his heart.

OBITUARY OF THE YEAR.

The following is a list of the Fellows who have died during the year 1907–1908 (April 30):—

Lord Aldenham; Sir John Ardagh; Dr. Robert Barnes; Matthew Blakiston; Sir D. Brandis; T. W. Bushill; E. Bibby; R. Vicars Boyle; William Brodie; Captain W. Buckley; H. L. Bischoffsheim; Colonel A. W. Baird; Colonel H. F. Blair; Lieut. J. Bennett-Yates; Commander Casberd-Boteler; Jas. Coate; G. B. Chace; Robert Ingham Clark; Wm. Clauson-Thue; Earl of Clanwilliam; Major-General Sir J. F. Crease; John Cleghorn; Captain C. F. Cromie; Colonel Sir H. Colvile; J. D. Campbell; Captain G. N. Conlan; N. H. Cohen; W. Callow; Ebenezer Cayford; Roderick Campbell; H. A. Cockerell; H. A. N. Dunsford; John Dodd; Earl of Dunmore; Mrs. Dormer; D. Drake; General Sir Joseph Fayrer; J. Gibson Fleming; Captain G. B. Gosling; C. L. Griesbach; Sir Frederic Goldsmid; G. A. Graham; S. G. Glanville; C. J. R. Gardiner; F. G. Henriques; Harrison Hodgson; Henry Hague; D. E. Hume; Prof. A. Heilprin; Rev. W. A. Jolley; C. E. Johnston; D. J. Kennelly; H. R. Knight; Frank Karuth; F. R. Kendall; John Leckie; N. J. Lyon; Rev. W. G. Lawes; J. T. Leonard; J. G. Langham; Admiral Marcus Lowther; Sir J. D. Milburn; Admiral J. F. L. P. Maclear; Sir F. Leopold M'Clintock; W. E. Malcolm; M. G. Morrison; H. A. Mangles; Admiral Sir Mervyn B. Medlycott; A. H. Neumann; Colonel J. A. Nunn; Mrs. Mary L. O'Donoghue; G. M. Ogilvie; Captain Henry Owen; Lord Overtoun; Lieut. G. F. Phillips; Henry Moncreiff Paul; Lord Edward Pelham Clinton; Captain G. Pirie; Robert Paul; Dr. E. J. Routh; T. J. Robertson; Captain G. W. Read; Walmsley Stanley; Major-General Synge; Howard Saunders; John Stuart; Rev. F. A. Stewart-Savile; F. H. R. Sawyer; R. S. Sly; General Sir Richard Strachey; J. Benjamin Scott; Rupert Swindells; Captain Buchan Telfer; Dr. Francisco Uriburu; F. R. S. Wyllie; Admiral Thomas Le Hunte Ward; George Gray; John Waite; Robert Wharton; F. F. Zehetmayr.

CORRESPONDENCE.

Journeys of the late W. H. Johnson.

It would appear, from Dr. Workman's letter in the June number of this *Journal* (p. 683), that he still confuses Johnson's journey of 1864 with that of 1865. In his paper in the *Journal* for January last (p. 26), Dr. Workman, in discussing the possibility of Johnson having camped at over 22,000 feet, said that "it must have been on the peak E 61, the only peak in the neighbourhood exceeding 22,000 feet." Having placed Johnson's camp on E 61, he then proceeds to pull down the mountain. I pointed out (p. 345) in the letter he now replies to, firstly, that this camp could not have been situated on E 61 (see *Alpine Journal*, 1884, vol. 12, p. 58; *Proceedings R.G.S.*, 1875, vol. 19, p. 362; and 'Synopsis of Results, etc., G.T.S.,' vol. 7, p. 39); and, secondly, that in the range of the Kuen Luen, of which E 61 (now Muztagh K_8) is, according to the latest surveys, the culminating point, there are five other measured peaks of over 23,000 feet (see latest maps and Dr. Stein's views of the Kuen Luen now in course of publication by the Society).

I have dealt more fully with some of Johnson's very remarkable but little-known mountaineering achievements in a paper in the *Alpine Journal*, which I am

told will be published in the May number this week, and to which I would refer any one interested in the history of Himalayan ascents.

T. G. LONGSTAFF.

June 4, 1908.

[*This correspondence cannot be continued.*]

The Westernmost Feeders of the Nile.

The Black Watch, Kilbegan, June 10, 1908.

It is with no wish to enter into what must be an unconvincing discussion that I beg to write to contradict some of Captain Perceval's contradictions. My deductions were not second-hand ones, and I venture to point out that the Arabic word meaning "custom" is spelt with a different letter to that of the penultimate syllable of "Barada." I spent very nearly a month at Kafiakingi. I regret that I took for granted that the "Um" preceding the names of several rivers is the Kreish word for "river." I did not verify it at the time. The small stream near Kafiakingi is known at times to illiterate natives as the (*Um*)-vongo. The *Um*belacha is the well-known stream; the *Um*bom is a small perennial stream between the latter and former. That the Barada should be known as *Um*barada bears out my contention. (I did not know that Schweinfurth came further north than Dem Zubeir.) *

As to size, the Umbelacha 40 miles north-west of the Barada (*i.e.* near Hofrat en Nahas) is quite one-third, if not half, again larger than the Barada.

As to the festival. It is a well-known one at Khandak, where the miracle tree and oracle have been for generations. This is 10 miles from Kafiakingi, and not on the river, I was informed. I did not go there myself.

In that very hilly district quite a number of streams of some size flow into both rivers; some quite considerable ones were passed by me on my way to J. Migi.

D. COMYN.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1907–1908.

Anniversary Meeting, May 25, 1908.—The Right Hon. Sir GEORGE T. GOLDIE, K.C.M.G., D.C.L., LL.D., F.R.S., President, in the Chair.

THE Secretary read the Minutes of the last Anniversary Meeting, which were confirmed and signed by the President.

The Secretary read the list of newly elected Fellows.

ELECTIONS.—*Charles H. Laurance Alder; A. Bishop; C. L. Chevalier; J. S. Coates; Wm. Edwin Gaze; R. G. Grieve, M.A.; George Hepworth; S. M. L. Iredell; Captain E. M. Jack, R.E.; Rev. Thomas Broadwood Johnson; Captain H. H. Kelly, R.E.; The Earl of Kingston; Stanley Knowles; W. Kennedy Laurie Dickson; Lieut. Leander McCormick-Goodhart, R.N.; Hon. Robert McNab; Wm. Arthur Moore; Captain Stanley Musgrave; Hon. F. R. D. Prittie; Stanley Unwin; Harry Gordon Webb, M.R.C.S.; Mark Arthur Wolff.*

* Captain Perceval was not responsible for the reference to Schweinfurth, which seems to have been incorrect. That traveller did print an itinerary through the Kreish country, but the first mention of the Ada seems to have been made by *Potagos* (1876–77).—(ED. *G.J.*)

The Presentation of Medals and Other Awards.

The President: The next business on our Agenda is the presentation of the medals and other awards, and I will in the first place call on Lieut. Boyd Alexander to receive his award. Lieut. Boyd Alexander, with the consent of His Majesty, the Society has awarded to you the Founder's Medal for the following reasons: After having spent some time in Fernando Po and on the west coast of Africa, mainly in natural history research, you organized a thoroughly well equipped expedition with an adequate staff, which left England in February, 1904, and spent three years in the exploration of the region between the Benue and Lake Chad, from Lake Chad along the Shari, down to the northern tributaries of the Congo, made its way along the Welle, from the upper waters of which the expedition crossed to the Nile basin, descending the Yei to the Bahr el Jebel and so down the Nile to Cairo. During this extensive journey a careful trigonometrical survey was made of the region between the Benue and Lake Chad. You devoted a considerable time to the exploration of Lake Chad, and added materially to our knowledge of that constantly shifting lake. A careful study was made of the hydrography of the various river systems, the Niger, the Congo, and the Nile, through which the expedition passed. Detailed maps were made of the more unknown parts of the region, such as the Bamingi, Kibali, and the Yei rivers. Much information was gathered concerning the physical features of the region passed through; careful studies were made of several of the types of natives, and important additions were made to our knowledge of the natural history of the extensive region. The expenses of the expedition were entirely defrayed by yourself and your friend, Captain Gosling, who died in the midst of his work. Altogether, your expedition, from a scientific point of view, was one of the most important that has entered Africa for many years. I have great pleasure in presenting to you the Founder's Medal.

Lieut. Alexander: I thank you very much indeed for the great honour which your illustrious Society has given me—an honour, I might add, most coveted by all keen geographers; but when I think of the work which attained this honour, I cannot forget that there are others who gave more than I did, namely, their lives, and so I shall cherish always this splendid honour, and hold it in part for them. Sir George Goldie, I thank you very much indeed.

The President: The Society will regret the fact that the recipient of the Patron's Medal, His Highness, the Prince of Monaco, is unable to attend to-day, because, as you will have seen in the papers, he has been suffering from severe illness. His Highness hopes, however, that a little later in the season, perhaps some time in June, he may be able to come to London and receive from the Society the Patron's Medal, which we had hoped to have given him to-day.

The Murchison Award for 1908 has been given to Colonel Delmé-Radcliffe for his important work, when, as resident in the Nile province of Uganda, he mapped the whole province, and for the excellent work which he did afterwards when in charge of the English section of the Anglo-German Boundary Commission, between Victoria Nyanza and Mount Ruwenzori. Colonel Delmé-Radcliffe cannot be here himself, but I am charged to hand his diploma to Dr. Scott Keltie, who will transmit it to him.

The recipient of the next award, the Gill Memorial, is present to-day. It is Dr. Longstaff, and I will ask him to be good enough to come upon the platform. Dr. Longstaff, the Gill Memorial for 1908 has been awarded to you for the important exploring work which you did at your own expense in the Western Himalaya and Tibet, and especially on your last expedition in the Garhwal

Himalaya, when you ascended the summit of Trisul. It is a very great satisfaction to me to present this award to you.

Dr. LONGSTAFF: I thank you very much for this award; it will be a great encouragement to me to try to do more in future. Perhaps I may say that I am very proud to have my name associated with that of Captain Gill.

The PRESIDENT: The Back Bequest for 1908 is awarded to Lieut. Mulock for his survey work on the National Antarctic Expedition, and for his long-continued work in preparing the six sheets of Antarctic charts. Lieut. Mulock, I need hardly tell you that the Society are fully alive to the great merits of the work which you have done.

Lieut. MULOCK: I am deeply grateful for this generous recognition of my services, and am keenly sensitive to the honour which you have done me in nominating me to be the recipient of the Back Bequest. I should like to take this opportunity of acknowledging the deep debt of gratitude I owe to Sir Clements Markham, Admiral Markham, Captain Scott, Captain Pirey Cust, and Captain Colbeck for affording me the opportunity of earning this award.

The PRESIDENT: The Cuthbert Peek Grant for 1908 has been awarded to Rai Sahib Ram Singh, native Indian surveyor, who has done excellent surveying work on the expeditions of Captain Deasy, Dr. Stein, Captain Rawling, and Major Ryder. He has been asked what form his award shall take, and we have not yet heard from him. His diploma is here, and I propose to hand it to Sir Thomas Holdich, and ask him to say a few words on behalf of Ram Singh.

Sir THOMAS HOLDICH: Sir George Goldie, I need hardly say that it gives me the very greatest pleasure to accept an award which is given to one of that great staff of geographers in India, with whom I have been so very long associated. I would venture to remind a late chief of mine who is here of what he once said in his report after a very long protracted geographical exploration in the far regions of the Oxus. He said the Government of India have no better body of servants than the native surveyors of India. I am not personally acquainted with Ram Singh, but I can assure you of this, that he is one of the best.

The President then delivered his anniversary address (see p. 1).

After the visitors had withdrawn, the PRESIDENT said: It is now my business to appoint scrutineers for the ballot which will be taken presently, and I name Mr. Gladstone and Captain Stiffe.

My vacating to-day the office of President calls for some remarks personal to myself and to my colleague whom the Council propose to you as my successor. I have had so many inquiries, both written and verbal, why I have not allowed myself to be nominated for election for another term, that it seems due to the Society to state to you very briefly my only but sufficient reason—I have already stated it to my colleagues on the Council—for refusing definitely to stand again to-day as a candidate for an office, the honour and interest of which I have deeply appreciated.

I hold strongly that, except in very special circumstances, three years is the extreme continuous period that any one should occupy this chair. The long presidency of my distinguished predecessor was desirable on quite exceptional grounds. Our National Antarctic enterprise took years to initiate and bring to maturity, and further years to organize and carry to completion. It was desirable that the conduct of this enterprise, which involved both the reputation of our Society and a large portion of its capital, should remain in the hands of a single, responsible, and competent expert from its initiation to its close. Moreover, Sir Clements Markham had a world-wide reputation as a geographer long before he was elected to this chair in 1893. No corresponding special reasons now exist to

justify my breaking what I hold to be a necessary rule if our Society is to maintain its vitality. I also attach great importance to the principle of not unduly blocking the path of promotion of those who serve the Society on its Council. This principle is supported by precedent. During the sixty-two years from the founding of the Society to the accession of my predecessor, the presidency changed hands twenty-eight times, giving an average of a little over two years of continuous occupation. I have held the office for three years, and I quit it with sincere regret.

That regret, however, will be lessened if you elect as my successor the candidate recommended to you by the Council, Major Leonard Darwin. For fifteen years he has been not only honorary secretary, but also an assiduous worker in that post, as those of us who have been on the Council throughout that period can vouch. He possesses, consequently, an exceptional knowledge of the intimate working of our Society, and of both its potentialities and its limitations. Not only past and present members of the Council, but also many others of our Fellows, have had opportunities of recognizing his exceptionally sound judgment, his impartiality of view, and his openness of mind—to say nothing of the chief of all qualities, painstaking industry. I am confident that under his guidance the labours of our Council and Committees would combine the vigour and smoothness so essential to effective work. I may perhaps add that there would be a special fitness in his election at this time, as next year is the Darwin Centenary.

Sir Thomas Holdich: I think this is a good opportunity for me to ask you, as a Society, to join in a cordial vote of thanks to Sir George Goldie for the great services he has rendered to the Society during his tenure of office. We are all of us proud to know that the Society has never wanted able or distinguished men to assist its Council. We have had in the list of Members of Council men distinguished in almost every walk of life, but I doubt whether we have had any one who has given such heart-whole energies for the benefit of the Society as has Sir George Goldie. It is not for me here and now, to enter into any eulogy of Sir George Goldie's public career for several reasons. In the first place I consider that his services to his country are part of this country's history; in the second place to summarize even a part of them would take a long time; and thirdly, I have a strong suspicion that Sir George participates in the prejudice against speeches of this sort, which was expressed to me by another great man, when he said, "I would rather not listen to an obituary notice before I am ready for it." But what Sir George Goldie has done for this Society we all know. We know that at the time when he took charge the financial state of it was not, perhaps, all that could have been desired. Large expenditure had been incurred in connection with the Antarctic expedition, and it required very great and careful attention to the finances of the Society to bring out a satisfactory issue on the balance sheet. This very ungrateful task, the task of revising estimates and cutting down expenditure, Sir George Goldie took in hand, and I think I may fairly say that he thoroughly and successfully revised the financial position. He leaves the Society now thoroughly sound. That is not all. I think we have also to thank Sir George Goldie for his insistency in supporting the movement for the spread of geographical education in this country, and for making the Society fully sustain its share in that movement. Now we all know what the position was some few years ago, and most of us can mark the difference that has occurred. From highest to lowest, I may say from the Foreign Office to Board Schools, geography is now recognized as an integral part of every citizen's education. It was not so three or four years ago, and I think that for the success of this movement so far, and for the support which we have gained all round the country from universities and educational centres generally, we have chiefly to thank Sir George Goldie. It was, at any rate, his hand that started

it, and I think he may fairly depend on the Council that he leaves behind him to keep that movement going. In short, Sir George leaves the Society in a strong financial position; with an enhanced reputation; and with an increasing sphere of usefulness. I may ask you, then, cordially to thank Sir George Goldie for all that he has done for the Society.

Lord BELHAVEN: It is my very pleasing duty to second this vote of thanks. We all, who have served on the Council, have had the very greatest advantage by the presidency of Sir George Goldie during his term of office, and we did press him very much to stay longer as President of the Society, but he has explained to you his reasons for his refusal. I can only cordially support the words which Sir Thomas Holdich has used. I beg to second this motion.

Sir THOMAS HOLDICH: I will now put it to the meeting; his services are recognised by us, and we cordially thank him for all he has done for the Society. Carried unanimously.

Sir GEORGE GOLDIE: It is a little difficult to speak at one's own funeral. I shall only say a very few words: you will not measure my feelings by the length of my remarks. I cannot tell you how deeply I feel the recognition you have just given to such services as I have been able to render. I am afraid that you value them more highly than they deserve, but I feel most deeply the sympathy that there is between your retiring President and the Society. It is a great pleasure. If I have done any work for the Society, I am amply repaid for it at this moment. I thank you from my heart.

The report of the Council was then read. It will be published in the next Year-Book.

The PRESIDENT: I have now to announce to you the report of the scrutineers, namely that the Council list has been adopted unanimously, with this exception, that one of the Fellows has proposed, as President, the name of Lord Curzon. I may tell you that I have approached Lord Curzon repeatedly during the last two years to induce him to be a candidate for the Presidency.

This concludes the Anniversary Meeting, and the Special General Meeting, of which notice has already been given, will now commence.

Sir THOMAS HOLDICH: I beg to move that Sir George Goldie be asked to take the chair.

The Council list is as follows, new members or those changing office being printed in italics:—

President: Major Leonard Darwin. Vice-Presidents: Sir Harry H. Johnston, G.C.M.G., K.C.B.; Right Hon. Lord Curzon of Kedleston, G.C.S.I., G.C.I.E., etc.; Douglas W. Freshfield; *Right Hon. Sir J. West Ridgeway*, K.C.B., G.C.M.G., K.C.S.I.; Colonel Sir Colin C. Scott-Moncrieff, R.E., K.C.M.G., K.C.S.I.; Sir Clements Markham, K.C.B., F.R.S., F.S.A. *Treasurer:* Edward L. Somers Cocks. *Trustees:* Right Hon. Lord Avebury, D.C.L., F.R.S.; Lord Belhaven and Stenton. *Hon. Secretaries: Major Charles F. Close*, C.M.G., R.E.; Colonel Sir D. A. Johnston, K.C.M.G., C.B., R.E. *Foreign Secretary:* Sir John Kirk, K.C.B., G.C.M.G., F.R.S. *Councillors: Henry Balfour*, M.A., F.Z.S.; *Admiral Sir Lewis Beaumont*, K.C.B., K.C.M.G.; Colonel G. Earl Church; Sir Martin Conway, M.A., F.S.A.; Admiral A. Mostyn Field, F.R.S.; *Colonel H. W. Feilden*, C.B.; J. Stanley Gardiner, M.A.; Sir David Gill, K.C.B., LL.D., F.R.S.; *Right Hon. Sir George D. Taubman Goldie*, K.C.M.G., F.R.S., D.C.L., LL.D.; *Colonel R. C. Hellard*, C.B., R.E.; Sir Clement L. Hill, K.C.M.G., C.B., M.P.; Colonel Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., C.B., R.E.; James F. Hughes; *Right Hon. Lord Lamington*, G.C.M.G.; *Dr. T. G. Longstaff*; Sir George S. Mackenzie, K.C.M.G., C.B.; Earl of Ronaldshay, M.P.; Dr. Aubrey Strahan, F.R.S.; H. Yates Thompson; Professor W. W. Watts, F.R.S.; Colonel C. E. Yate, C.S.I., C.M.G.

Special General Meeting, May 25, 1908.—The Right Hon. Sir GEORGE T. GOLDIE, K.C.M.G., D.C.L., LL.D., F.R.S., in the Chair.

This meeting was summoned in accordance with the bye-laws, chapter vi. section 2, paragraphs 1, 3, and 4, for the purpose of considering a proposal by the Council that the annual subscription and the compounding fees should be raised in the case of all Fellows joining after the date of the meeting.

After some discussion the meeting adopted an amended resolution that after the date of May 25, 1908, the entrance fee should be £5, and the annual subscription £3; that the compounding fee on entrance should be £45, and at any subsequent period on the following scale, provided that there should be at the time no arrears due to the Society—

Fellows of 10 years' standing and under					15	...	...	£30
,,	15	,,	,,	,,	20	...	...	£24
,,	20	,,	,,	over	20	...	...	£18 15s.

It was also decided that subscription and compounding fees of Fellows elected before or on May 25, 1908, should remain as heretofore, namely the annual subscription £2, and the compounding fee—

Fellows of 10 years' standing and under					15	...	...	£20
,,	15	,,	,,	,,	20	...	...	£16
,,	20	,,	,,	over	20	...	...	£12 10s.

ANNIVERSARY DINNER.

The Anniversary Dinner took place in the evening at the Whitehall Rooms of the Hôtel Métropole. Major Leonard Darwin, the President, was in the chair, and among those present were: the Italian Ambassador, the Norwegian Minister, the Vice-Chancellor of Cambridge, the Principal of the University of London, Right Hon. Lord Belhaven, Sir Henry Bulwer, Sir W. Lee Warner, Lord Joicey, Captain R. Muirhead Collins (Representative of the Australian Commonwealth), Colonel Sir T. H. Holdich, Sir A. Rucker, Lord Colchester, Admiral Sir Lewis Beaumont, Mr. G. E. Buckle, Right Hon. Sir George T. Goldie, Sir F. C. Gould, Sir Clement Hill, Sir C. P. Lucas, Colonel Hon. M. G. Talbot, Dr. Marconi, Sir William Ramsay, Admiral A. Mostyn Field, Sir Robert Morant, Colonel R. Hellard, Lieut. Boyd Alexander, General Sir Thomas Fraser, Mr. Fabian Ware, Mr. H. Yates Thompson, Dr. Teall, Dr. Glazebrook, Colonel C. E. Yate, Dr. A. Strahan, Colonel Sir Duncan Johnston, Major C. F. Close, Mr. Edward L. S. Cocks, Mr. C. W. Hobley, Mr. Louis Becke, Prof. Sollas, Mr. D. G. Hogarth, Mr. Laurence Gomme, Dr. Kimmins, Colonel Feilden, Sir George S. Mackenzie, Colonel G. E. Church.

After the toasts of "Our Patron, the King," and "Our Vice-Patron, the Prince of Wales," the PRESIDENT proposed the toast of "The Medallists," to which Lieut. BOYD ALEXANDER replied. The PRESIDENT then proposed the toast of "The Retiring President, The Right Hon. Sir George T. Goldie, K.C.M.G.," which was responded to by Sir GEORGE GOLDIE. The toast of "The Guests" was proposed by Colonel Sir T. H. HOLDICH, which was responded to by H.E. the Italian Ambassador, Dr. G. MARCONI, and Sir FRANCIS CARRUTHERS GOULD. The toast of "The Universities" was proposed by Mr. D. G. HOGARTH, and responded to by the Vice-Chancellor of Cambridge University.

Dr. J. J. H. TEALL proposed the toast of "The President and the Society," which was responded to by the PRESIDENT.

Fifteenth Meeting, June 15, 1908.—Major LEONARD DARWIN, President, in the Chair.

ELECTIONS—*Moritaro Abé; T. E. Andrews, B.A.; Henry Oliver Beckit, M.A.; A. C. P. Birch; N. de L. Davis, B.A.; Prof. T. E. Everard; William C. Farabee; Rev. T. J. Williams-Fisher, B.A.; Robert Vaughan Gower; H. A. Hetherington; John Holdsworth; Samuel James Hutchinson; Hugh Kirkhope, M.A.; W. J. Laidlay, B.A.; Harold B. Lewin; John McFarlane, M.A.; Charles A. G. Mackintosh; Nicol Finlayson Mackenzie; George Marvin; Charles Phillips; P. M. Roxby, B.A.; Arthur John Sargent; Rev. Edward Clarke Spicer, M.A.; R. L. Thompson, B.A.; Herbert Comyn Walker; J. H. L. York, B.A.*

Major DARWIN, the President, said: In taking the chair as President for the first time, may I be allowed to thank the Fellows here present for the great honour they have done me in electing me to that office? I fully recognize the responsibility entailed in assuming this post, and I can only say that I trust that the confidence reposed in me will not be mistaken. Before proceeding to the business of this evening, I am quite sure that you will wish me to welcome in your name the representatives here present of the Commercial Geographical Society of Paris. Politics here are strictly excluded, but I am quite sure that within that unwritten rule we do not include expressions of friendship to friendly nations. The *entente cordiale* between England and France is now so thoroughly established that it is specially pleasing, on an occasion of this sort, to welcome French geographers of distinction amongst us. We have here to-night several French geographers representing this society who have done admirable work in various quarters of the globe. We have M. Dupuis, the *doyen* of French explorers; M. Chevalier, whose work on Lake Chad is so well known in this country; we have M. Labbé, the secretary-general of the society; and M. Gaudy, treasurer, and a geographer of distinction. To all of these, and to the representatives of the other aspects of this society, such as Le Comte de Saint Clair, Consul-General, I am sure you will wish me in your name to offer the very heartiest reception.

The paper read was:—

"Journey on the Upper Salwin." By George Forrest.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Adriatic Sea. *G. Jahresbericht Österreich* **6** (1907): 1–14. **Grund.**

Die Entstehung und Geschichte des Adriatischen Meeres. Von Dr. Alfred Grund. *Sketch-map and Section.*

Alps. **Schmidt.**

Bild und Bau der Schweizer Alpen. Von Dr. Carl Schmidt. (Beilage zum Jahrbuch der Schweizer Alpen Club, Jahrgang xliii., 1906–07.) Basel, 1907. Size 10 × 7, pp. 92. *Maps, Sections, and Illustrations.*

Alps—Anthropogeography. **Sieger.**

Verhandl. XVI. Deuts. G.-tages, Nürnberg (1907): 262–272.

Zur geographie der zeitweise bewohnten Siedlungen in den Alpen. Von Prof. Dr. Robert Sieger.

See note in vol. 30, p. 557.

Alps—Phytogeography. **Thompson.**

Liste des phanérogames et cryptogames vasculaires recueillis au-dessus de 8000 feet (2440 metres) dans les districts du Mont-Cenis, de la Savoie, du Dauphiné et des Alpes-Maritimes (Juin-Septembre, 1907); avec quelques notes sur les limites altitudinales des plants alpines. Par Harold Stuart Thompson. Le Mans, 1908. Size 9¼ × 6½, pp. 195–248. *Sketch-map.*

Austria—Bohemia. *La G., B.S.G. Paris* **17** (1908): 1–16. **Machaček.**

Nouvelles observations géomorphologiques sur le massif de la Bohême. Par Dr. Fritz Machaček. *Illustrations.*

See note in the May number, p. 562.

Austria—Carniola. *G. Jahresbericht Österreich* **4** (1906): 9–74. **Lucerna.**

Gletscherspuren in den Steiner Alpen. Von Dr. Roman Lucerna. *Map, Illustrations, and Sections.*

Austria—Istria. *G. Jahresbericht Österreich* **4** (1906): 75–85. **Krebs.**

Verbogene Verebnungsflächen in Istrien. Von Dr. Norbert Krebs. *Sections.*

Austria—Meteorology. *G. Jahresbericht Österreich* **6** (1907): 15–65. **Deutsch.**

Die Niederschlagsverhältnisse im Mur-, Drau- und Savegebiete. (Für den Zeitraum 1891–1900.) Von Dr. Paul Deutsch. *Map and Diagrams.*

Central Europe—Communications. *B.S.R. Belge G.* **31** (1907): 413–434. **Clerget.**

Les communications transalpestres. Étude de géographie économique. Par Pierre Clerget. *Sketch-map.*

Danube. *Petermanns M., Erganzungsheft* **160** (1908): pp. iv. and 64. **Cvijić.**

Entwickelungsgeschichte des Eisernen Tores. Von Dr. J. Cvijić. *Maps, Illustrations, and Sections.*

See note in the March number, p. 332.

Danube. *Naturw. Wochenschrift* **23** (1908): 97–109. **Endriss.**

Die Rheinische Donau. Von Prof. Dr. K. Endriss. *Maps and Illustrations.*

See note in the April number, p. 440.

English Channel. **Butler and Turner.**

Channel Tunnel. Reports by British and French engineers. Papers on national defence, by General Sir William Butler, Major-General Sir Alfred E. Turner, and Vice-Admiral Sir Charles Campbell. London: W. T. Perkins, 1907. Size 11 × 8½, pp. 56. *Maps, Illustrations, and Diagrams.*

Europe—Seismology. *Atti R.A. Lincei, Rendiconti* **16** (1907): 1 Sem., 916–920. **Monti.**

Di alcune possibili relazione tra la sismicità della Svizzera e quella dell'alta Italia. Nota di V. Monti. *Sketch-map.*

France—Central. *C.R.A. Sc. Paris* **146** (1908): 432–434. **Glangeaud.**

Sur l'extension des dépressions oligocènes dans une partie du Massif central et sur leur rôle au point de vue hydrologique. Par Ph. Glangeaud. *Sketch-map.*

France—Central. *Ann. G.* **16** (1907): 296–308, 399–413. **Gallois.**
Excursion géographique interuniversitaire autour de Paris et dans le Morvan. Par L. Gallois. *Illustrations.*

France, Central—Anthropogeography. **Boyer and others.**
Les populations forestières du centre de la France; Morvand, Bas Nivernais, Puisaye. Par A. Boyer, E. Demolins, le Cte. de Damas d'Anlezy, et P. Descamps. (Bibliothèque de la science sociale.) Paris: Bureaux de la Science Sociale, 1907. Size 10 × 6½, pp. 86.
See note in the Monthly Record, *ante.*

France—Finistère. *B.I. Océanogr. Monaco* **111** (1908): pp. 30. **Legendre.**
Recherches océanographiques faites dans la région littorale de Concarneau pendant l'été de 1907. Par R. Legendre. *Diagrams.*

France—North-East. **Chantriot.**
B.S.G. de l'Est **27** (1906): 273–300, 399–422; **28** (1907): 31–41, 147–160, 277–292.
Les cartes anciennes de la Champagne. Par Emile Chantriot.

France—Population. ——
République Française; Direction du travail. Service du recensement. Album graphique de la statistique générale de la France. Paris, 1907. Size 11 × 9, pp. viii. and 280. *Maps and Diagrams.*
A number of sketch-maps illustrate graphically the various distributions of population, etc., according to the census of 1901.

France—Savoie. *B.S. Neuchatel. G.* **18** (1907): 75–87. **Girardin.**
Le glacier de Bézin en Maurienne. Contribution à l'étude de l'érosion glaciaire. Par Paul Girardin. *Sketch-maps and Illustrations.*

France—South. *Ann. G.* **16** (1907): 414–429. **Sorre.**
La plaine du Bas-Languedoc. Etude de géographie humaine par Maximilien Sorre. *Sketch-maps.*
See note in the May number, p. 563.

France—Water-power. ——
Ministère de l'Agriculture. Annales: Direction de l'hydraulique et des améliorations agicoles. Fascicule 32. Service d'études des grandes forces hydrauliques (région des Alpes). Tome 2. Paris, 1905. Size 11 × 7, pp. 452. *Maps and Diagr.*

French Colonies. **Lister.**
France, No. 1 (1908). Report by the Hon. Reginald Lister, His Majesty's Minister at Paris, upon the French Colonies. London: Wyman & Sons. Size 13 × 8½, pp. 68. *Price 7d.*

Germany—Bavaria. *M.G. Ges. München* **2** (1907): 93–196. **Breu.**
Der Tegernsee, eine limnologische Studie. Von Georg Breu. *Maps and Sections.*

Germany—Bavaria. *Verhandl. XVI. Deuts. G.-tages, Nürnberg* (1907): 334–342. **Breu.**
Neue Seestudien in Bayern. Von Georg Breu.

Germany—Bavaria. *Verhandl. XVI. G.-tages, Nürnberg* (1907): 147–177. **Müller.**
Der Nürnberger Reichswald, seine Bodenbeschaffenheit und seine Bewirtschaftung von 13. bis zum 16. Jahrhundert. Von Dr. Johannes Müller.

Germany—Bavaria—Fauna. *M.G. Ges. München* **2** (1907): 41–82. **Reindl.**
Bayerns in historischer Zeit ausgerottete und ausgestorbene Tiere. Ein Beitrag zur Zoogeographie. Von Dr. Jos. Reindl.

Germany—Bavaria—Map. **Gasser.**
Verhandl. XVI. Deuts. G.-tages, Nürnberg (1907): 102–123.
Zur Technik der Apianischen Karte von Bayern. Von Dr. Max Gasser. *Facsimile-maps.*

Germany—Communications. *Questions diplomatiques* **25** (1908): 97–105. **Braun.**
La Canalisation de la Moselle. Par Pierre Braun. *Maps.*

Germany—Frankfurt. ——
Statistische Handbuch der Stadt Frankfurt-am-Main . . . herausgegeben durch das Statistische Amt. Erste Ausgabe, 1905/06. Frankfurt-a.-M., 1907. Size 10½ × 7, pp. 306.

Germany—Hanover *G.Z.* **14** (1908): 83-94. **Olbricht.**

Die Lüneburger Heide. Von K. Olbricht.

Noticed in the May number, p. 562.

Germany—Mecklenburg. **Geinitz.**

Die Stoltera bei Warnemünde. Von Dr. E. Geinitz. ('Mitteilungen aus der Grossherzogl. Mecklenburg. Geologischen Landesanstalt,' xix.) Rostock, 1907. Size 11¼ × 9, pp. 26. *Map and Illustrations.*

The stoltera is an escarpment of the diluvial plateau.

Germany—Saxony—Survey. *M.k.k.G. Ges. Wien* **50** (1907): 438-444. **Paldus.**

Grundlegung der Herrschaft Schwarzenberg in Sachsen 1555. Von Josef Paldus. *Sketch-maps.*

The original large-scale survey sheets have lately been brought to light in Vienna. The work was done by compass and measurement.

Germany—Winds. *Ann. Hydrographie* **36** (1908): 49-63. **Köppen.**

Die Windrichtung in 800 Drachensaufstiegen und 44 "Abreisern" bei Hamburg, 1903-1906. Von W. Köppen.

Greece—Coast-changes. **Négris.**

Ph. Négris. Délos et la transgression actuelle des mers. Athens, etc., 1907. Size 10 × 7, pp. 24. *Price* 1*s.* 3*d.*

Noticed in the May number, p. 570.

Hungary—Carpathians. *Rev. G. Annuelle* **1** (1906-07): xi.-xxi. and 1-279. **Martonne.**

Recherches sur l'évolution morphologique des Alpes de Transylvanie (Karpathes méridionales). Par E. de Martonne. *Maps and Illustrations.*

Hungary—Theiss. **Cholnoky.**

Ueber die Lagerveränderungen des Tiszabettes. Von Dr. Jenö von Cholnoky. (Separat-Abdruck aus den *Földrajzi Közlemények*, 1907, Bd. xxxv. Heft. 10.) [Budapest, 1907.] *Maps, Sections, and Illustrations.*

Hungary—Transylvania. *Deutsche Erde* **6** (1907): 214-217. **Kisch**

Deutsche Ortsnamen im Norden Siebenbürgens. Von Prof. Dr. Gustav Kisch.

Iceland—Survey. *G. Ts., k. Danske G.S.* **19** (1906-07): 145-148. **Jensen.**

Meddelelser om Generalstabens Arbejde paa Island i Sommeren 1907. Af P. F. Jensen. *Illustrations.*

Italy—Campania. *Riv. G. Italiana* **14** (1907): 193-210. **Gribaudi.**

Sul nome "Terra di Lavoro." Del Prof. P. Gribaudi.

Traces the use of the term from the "Laboriæ" of Pliny through the "Liburnia," etc., of later times.

Italy—Linosa. *J. Geology* **16** (1908): 1-35. **Washington.**

Linosa and its rocks. By Henry S. Washington. *Sketch-map and Illustration.*

Italy—Po. *Riv. G. Italiana* **14** (1907): 513-529. **Baratta.**

Sulle recenti trasformazioni del delta del Po (1893-1904). Osservazioni di Mario Baratta. *Sketch-map.*

Italy—Sicily—Etna. **Mendola and Eredia.**

Atti R.A. Lincei, Ser. V., Rendiconti **16** (1907): 2 Sem., 34-40.

Secondo riassunto delle osservazioni meteorologiche eseguite all' Osservatorio su l'Etna dal 1892 al 1906. Nota dei dott. L. Mendola e F. Eredia.

Italy—Tuscany—Karst. *Riv. G. Italiana* **14** (1907): 545-557. **Stefanini.**

Fenomeni carsici nel gessi della Val d'Era. Di Giuseppe Stefanini. *Sketch-maps.*

Italy—Venetia. *Riv. G. Italiana* 14 (1907): 152-159, 221-229. **Prati.**

Novo contributo geonomastico, bacino superiore del fiume Brenta. Di Angelico Prati.

A discussion of local topographical terms.

Mediterranean. *B.S.G. Italiana* **8** (1907): 1222-1228. **Grasso.**

"Nostrum mare." Nota del prof. Gabriele Grasso.

On the use of this term by the Romans.

Mediterranean—Tide. **Marchi**

Atti R.A. Lincei, Rendiconti, Ser. V. **17** (1908): 1 Sem., 12–17.

La marea nel Mediterraneo. Nota di L. de Marchi.

Montenegro. *M.k.k.G. Ges. Wien* **50** (1907): 459–468. **Gessmann.**

Die Tropfsteinhöhle von Lipa in Montenegro. Von Gustav W. Gessmann. *Plan and Illustrations.*

Norway—Zoogeography. *Smithsonian Misc. Coll.* **48** (1907): 458–513. **Stejneger.**

The origin of the so-called Atlantic animals and plants of Western Norway. By Leonhard Stejneger. *Map and Illustrations.*

Russia—Caucasus. *G. Ts., Copenhagen* **19** (1907–08): 94–114. **Olufsen.**

Indtryk fra mine Rejser i Terekdistriktet og Nordkaukasus. Kossakkernes, Kabardinernes, og Osserternes Land. Af Ole Olufsen. *Map and Illustrations.*

Russia—Finland. **Heinrichs.**

Observations météorologiques, publiées par l'Institut Météorologique Central de la Société des Sciences de Finlande. État des glaces et des neiges en Finlande pendant l'hiver 1895–1896. Exposé par Axel Heinrichs. Helsingfors, 1907. Size 13½ × 10, pp. 50. *Maps.*

Russia—Geodesy. *B.A. Imp. Sc., St. Petersburg* **23** (1905): 173–194. **Vassileff.**

La grande base de Pulkovo. Par A. S. Vassiliev. [In Russian.]

Russia—Meteorology—Halos. **Leyst.**

Höfe um Sonne und Mond in Russland. Von Prof. Dr. Ernst Leyst. Moscow, 1906. Size 10 × 6½, pp. 110.

Russia—Volga. **Hey.**

Travaux Cabinet G. Physique, Université S. Pétersbourg, No. 3 (1906): 95–113.

La débacle et la congélation de la Volga. Par E. Hey. *Diagrams.* [In Russian; French *résumé*, p. 118.]

Russian Empire—Surveys. ———

Memoirs of the military-topographical section of the General Staff. Vol. **62** (2 parts). St. Petersburg, 1906. Size 12¼ × 9½, pp. (part i.) 222; (part ii.) 310. *Maps and Illustrations.* [In Russian.]

Includes a number of reports on survey operations in various portions of the Russian Empire.

Scandinavia—Geology. **Gregory.**

The great Scandinavian overthrust. By J. W. Gregory. (From *Science Progress*, No. 7, January, 1908.) London, 1908. Size 9½ × 6, pp. 399–412. *Map and Sections.*

South-East Europe—Dniester. *M.k.k.G. Ges. Wien* **50** (1907): 275–292. **Romer.**

Zur Geschichte des Dniestrtales. Von Prof. Dr. Eugeniusz Romer. *Sketch-map.*

South-West Europe—Wind. *B.S. Languedoc. G.* **30** (1907): 100–114. **Martonne.**

Note préliminaire sur le vent d'autan. Par E. de Martonne. *Sketch-maps.*

Sweden—Geological History. **Gavelin.**

Sveriges geol. Undersökning, Ser. C, **204** (1907): pp. 66. (*Årsbok* **1** (1907): No. 1.)

Studier öfver de postglaciala nivå- och klimatförändringarna på norra delen af det småländska höglandet. Af Axel Gavelin. *Maps and Sections.*

On changes of level and climate in the Highlands of Southern Sweden.

Sweden—Meteorology. **Westman.**

K. Svenska Vetenskaps-A. Handl. **42** (1907): No. 4, pp. 56.

Mesures de l'intensité de la radiation solaire faites à Upsala en 1901. Par J. Westman. *Diagram.*

Switzerland—Simplon Tunnel. *Le globe, B.S.G. Genève* **46** (1907): 138–148. **Gautier.**

La mesure des bases géodésiques et la mesure du Tunnel du Simplon en mars 1906. Par Prof. Raoul Gautier.

Switzerland—Water-power. *La G., B.S.G. Paris* **16** (1907): 291–308. **Dalemont.**

L'énergie des cours d'eau en Suisse. Par Julien Dalemont. *Map and Diagrams.*

United Kingdom—Peat mosses. ———

The peat-moss deposits in the Cross Fell, Caithness, and Isle of Man districts. Report of the Committee. (British Association, Leicester, 1907, Section K.) Size 8½ × 5½, pp. 8.

United Kingdom—Severn. **Prevost.**

The tidal wave or "bore" in the Severn. By Dr. E. W. Prevost. (Reprinted from the *Hereford Times* of Saturday, June 15, 1907.) Size 8 × 6½, 3 ll.

Brings together the results obtained by the writer and other observers.

ASIA.

Central Asia. **Obrucheff.**

An expedition to Jair, Semista, and Urkashar (in Western Jungaria) in 1906. Preliminary report, by V. A. Obrucheff. Tomsk, 1907. Size 10½ × 7, pp. 26 and 6. [In Russian.]

See note in the *Journal*, vol. 29, p. 457.

Central Asia—Tian-shan. **Prins.**

Abrégé B.S. Hongroise G. **35** (1907): 186–209; **36** (1908): 4–12.

Reiseskizzen aus Centralasien. Von Dr. Gyula Prinz. IV.–VII. (*Földrajzi Közlemenyek* **35** (1907), 405–411; **36** (1908): 6–23. *Maps and Illustrations.*)

China—Hangchow Bay. *Popular Sc. Monthly* **72** (1908): 97–115, 224–243. **Edmunds.**

A visit to the Hangchow bore. By Dr. Charles Keyser Edmunds. *Maps and Illustrations.*

China—Manchuria. **Edelstein.**

Mem. Imp. Russ. G.S., Gen. G. **38** (1906): No. 2, pp. 164.

Excursion through the districts of Sintzintin, Fin-khuan, and Liao-yang, in the Shentzin [Shing-king] province of Southern Manchuria. By J. C. Edelstein. *Map and Illustrations.*

The map shows the geological formations.

China—Sechuan. **Cordier.**

Les Lolos. État actuel de la question. Par Henri Cordier. (Extrait du "T'oung Pao," Serie II., vol. **8**, no. 5.) Leyden, 1907. Size 10 × 6½, pp. 92. *Illustrations.*

An exhaustive statement of the sources of our knowledge of the Lolos, many of which are little known to the public. (Cf. May number, p. 565.)

China—Sechuan. *La G., B.S.G. Paris* **17** (1908): 17–40. **Cordier.**

Les Lolos. État actuel de la question. Par Henri Cordier.

See May number, p. 565.

Chinese Empire—Mongolia and Tibet. *Scottish G. Mag.* **24** (1908): 141–151. **Black.**

Count de Lesdain's travels across Asia. By C. E. D. Black. *Map.*

Based on a narrative in the *Calcutta Review.*

Chinese Empire—Tibet. **Filchner.**

Verhandl. XVI. Deuts. G.-tages, Nürnberg (1907): 35–36.

Ueber einige Ergebnisse seiner Expedition, unter Vorlage der 1. Sektion seines Kartenwerkes "Nordost-Tibet." Von Leutnant Wilhelm Filchner.

Chinese Turkestan. *B. American G.S.* **40** (1908): 1–6. **Huntington.**

An archipelago of sand-dunes in a lake of Central Asia. By Ellsworth Huntington. *Map.*

AFRICA.

Abyssinia. *Cairo Sc. J.* **2** (1908): No. 16, 2–16. **Craig.**

Notes on an expedition to Addis Abbaba. By J. I. Craig.

Abyssinia. *Alpine J.* **24** (1908): 79–86. **Wherry.**

About Abyssinian Alps. By George Wherry. *Sketch-map and Illustration.*

Extracts from letters from an unnamed traveller in Northern Abyssinia are printed.

Africa—Missions. *Tour du Monde* **13** (1907): 277–312. **Ricard.**

Les missions d'Afrique des Pères Blancs. Par François Ricard. *Maps and Illustrations.*

Algeria and Tunis—Census. *An. G.* **17** (1908): 24–33. **Bernard.**

Le recensement de 1906 en Algérie et en Tunisie. Par Augustin Bernard.

Basutoland—Geology. *Geol. Mag.*, Dec. V. **5** (1908): 57–63, 112–118. **Dornan.**

Notes on the geology of Basutoland. By Rev. S. S. Dornan.

Congo State—Luama. *Riv. G. Italiana* **14** (1907): 211–220. **Sacerdote.**
Di una esplorazione compiuta sul fiume Luama affluente del Congo. Del tenente Amedeo Sacerdote. *Illustrations.*

Congo State—Minerals. *B.S. Belge Études Col.* **15** (1908): 95–105. **Buttgenbach.**
Le Congo deviendra-t-il un pays minier? Par H. Buttgenbach. *Map.*

Congo State—Zoology. **Fraipont.**
Annales du Musée du Congo; Zoologie, Série II. Contributions à la faune du Congo. Tome i. Okapia. Par Julien Fraipont. Brussels, 1907. Size 14½ × 11, pp. 120. *Illustrations.*

East Africa—Geology. **Muff.**
Report relating to the geology of the East Africa Protectorate. By H. Brantwood Muff. (Colonial Reports, Miscellaneous, No. 45, 1908.) Size 9 × 6, pp. 62. *Map and Sections. Price* 6*d.*
Noticed in the June number, p. 674.

Egypt. **Willcocks.**
The White Nile and the cotton crop. By Sir William Willcocks. [2 parts.] Cairo, 1907–08. Size 10½ × 7, pp. 20 and 18.

Egypt—Hydrology. *Cairo Sc. J.* **2** (1908): No. 16, 16–23. **Beckett.**
Notes on the underground water of Egypt. By H. W. Beckett.

Egypt—Libyan Desert. *Geol. Mag.*, Dec. V. **15** (1908): 49–57, 102–108. **Beadnell.**
Flowing wells and sub-surface water in Kharga Oasis. By Hugh John Llewellyn Beadnell. *Section and Illustration.*

Egypt—Meteorology. ———
Survey Department, Egypt. Meteorological Report for the year 1905. (2 parts.) Cairo, 1907. Size 14½ × 10½, pp. (part i.) vi. and 44; (part ii.) iv. and 56.

Egypt—Standard Time. *Cairo Sc. J.* **2** (1908): 50–59. **Lyons.**
Civil time in Egypt. By Captain H. G. Lyons.

Eritrea. *Riv. G. Italiana* **15** (1908): 1–19. **Beccari.**
Escursione nell' alto bacino del Barca e gita a Filfil (Coloni Eritrea). Appunti del dott. Nello Beccari. *Illustration.*

French Congo. *La G., B.S.G., Paris* **16** (1907): 423–426. **Lancrenon.**
Exploration entre la Sangha et le Logone. Par le Lieut. Lancrenon. *Sketch-map.*

French Congo. *B.S.G. Com. Havre* **24** (1907): 217–234, 330–337. **Trilles.**
Un voyage au Congo français. Par le R. P. Henri Trilles.

French Congo. *Renseignements Col., Com. Afrique française* (1908): 18–27. **Lancrenon.**
De la Sanga au Logone. Par le Lieut. P. Lancrenon. *Map.*

German East Africa. *Z. Ges. E. Berlin* (1908): 75–94. **Uhlig.**
Die Ostafrikanische Expedition der Otto Winter-Stiftung. Mitteilungen über eine Forschungsreise. Von Prof. Dr. C. Uhlig. *Illustrations.*
Another paper by Dr. Uhlig on the results of this expedition was summarized in the February number, p. 217.

German East Africa. *M. Deuts. Schutzgeb.* **21** (1908): 105–112. **Kohlschütter.**
Triangulation und Messtisch-Aufnahme des Ukinga-Gebirges sowie allgemeine Bemerkungen über koloniale topographische Karten. Von Dr. E. Kohlschütter. *Maps.*

German East Africa—Rift Valleys. **Uhlig.**
Verhandl. XVI. Deuts. G.-tages, Nürnberg (1907): 3–34.
Der sogenannte Grosse Ostafrikanische Graben zwischen Magad (Natron See) und Laua ya Mueri (Manyara-See). Von Prof. Dr. Carl Uhlig. *Map.*
See note in the February number, p. 217.

German South-West Africa. *M. Deuts. Schutzgebieten* **20** (1907): 131–164. **Gülland.**
Das Klima von Swakopmund. Von A. Gülland. *Diagrams.*

Ivory Coast. **Genghis.**
Quest. Dipl. et Col. **22** (1906): 407–423, 495–501, 550–558, 678–690.
En Côte d'Ivoire: fragments d'un journal de route. Par N. Genghis. *Maps.*

Kamerun. *M. Deuts. Schutzgeb.* **21** (1908): 15–35. **Guilleman.**
Ergebnisse geologischer Forschung im Deutschen Schutzgebiet Kamerun. Vorläufige Mitteilung von Dr. Guilleman. *Sketch-map.*

Kamerun. *M. Deuts. Schutzgeb.* **21** (1908): 3–12. **Hassert and Thorbecke.**
Erster Bericht über die landeskundliche Expedition der Herren Prof. Dr. K. Hassert und Prof. Dr. F. Thorbecke in Kamerun. *Sketch-map.*

Kamerun. *M. Deuts. Schutzgeb.* **21** (1908): 12–14. **Mansfeld.**
Der Totensee bei Nssakpé (Eken-Land). Von Dr. Mansfeld. *Sketch-map.*

Kamerun—Boundary. *B. Comité Afrique française* **17** (1907): 387–398. **Terrier.**
La Mission Moll: la délimitation du Cameroun. Par Auguste Terrier. *Map and Illustrations.*
See note in vol. **29**, p. 676.

Sahara. *Rev. G.* **1** (1906–07): 447–517. **Vélain.**
État actuel de nos connaissances sur la géographie et la géologie du Sahara d'après les explorations les plus récentes. Par Ch. Vélain. *Maps and Illustrations.*

Sahara. *B. Com. Afrique française* **17** (1907): 433–441. ——
La mission Arnaud—Cortier de l'une à l'autre rive du Sahara. *Map and Illustrations.*

Southern Rhodesia. *J. African S.* **26** (1908): 150–158. **Venning.**
Notes on Southern Rhodesian ruins in Victoria District. By J. H. Venning.

Transvaal—Geological Survey. ——
Transvaal Mines Department. Report of the Geological Survey for the year 1906. Pretoria, 1907. Size 11 × 8½, pp. viii. and 140. *Maps, Illustrations, and Sections. Presented by the Geological Survey, Transvaal.*

Uganda—Ruwenzori. **Wollaston and others.**
J. Linnean S. (Botany) **38** (1908): 228–279.
An Account of the Plants collected on Mount Ruwenzori by Dr. A. G. F. Wollaston. By Dr. A. B. Rendle, E. G. Baker, and S. Le M. Moore. *Illustrations.*

NORTH AMERICA.

Alaska. **McPherson.**
Letter from the Secretary of War, transmitting a letter submitting the engineer's (J. L. McPherson's) Report of reconnaissance and preliminary survey of a land route from the navigable waters of the Tanana River, at or near Fairbanks, to the vicinity of Council City, in the Seward Peninsula, Alaska, for a mail and pack trail along such route. [Washington, 1907.] Size 9 × 6, pp. 30. *Maps and Illustrations. Presented by the Author.*

Alaska—Flaxman Island. *J. Geology* **16** (1908): 56–63. **Leffingwell.**
Flaxman Island, a glacial remnant. By Ernest de Koven Leffingwell. *Illustrations.*

Canada—Glaciers. **Sherzer.**
Smithsonian Contributions to Knowledge **34** (1907): No. 1692, pp. xii. and 136.
Glaciers of the Canadian Rockies and Selkirks. (Smithsonian Expedition of 1904.) By William Hittell Sherzer. *Maps and Illustrations.*

Mexico—Phytogeography. **Purpus.**
Vegetationsbilder (ed. Karsten, etc.) **5** (1907): Plates 46–51.
Mexikanische Hochgipfel. Von Carl Albert Purpus. *Plates.*
Illustrations, with letterpress, of the alpine vegetation of the Mexican peaks.

North America—Geology. *An. G.* **17** (1908): 56–70. **Margerie.**
La carte géologique international de l'Amérique du Nord. Par Emm. de Margerie.

United States—Arid Region. *National G. Mag.* **19** (1908): 20–28. **Bigelow.**
Studies on the rate of evaporation at Reno, Nevada, and in the Salton Sink. By Prof. H. Bigelow. *Illustrations.*
See April number, p. 447.

United States—Arizona. *Smithsonian Misc. Coll.* **50** (1907): 289–329. **Fewkes.**
Excavations at Casa Grande, Arizona, in 1906–07. By J. Walter Fewkes. *Plans and Illustrations.*

United States—California. **Davidson.**

The discovery of San Francisco Bay; the rediscovery of the Port of Monterey; the establishment of the Presidio; and the founding of the mission of San Francisco. By Dr. George Davidson. (Extracted from the *Transactions and Proceedings of the Geographical Society of the Pacific*, vol. 4, ser. II., May, 1907.) San Francisco, 1907. Size 9½ × 6½, pp. iv. and 154.

See note in the January number, p. 108.

United States—Colorado River. *National Geol. Mag.* **19** (1908): 52–53. **MacDougal.**

More changes of the Colorado river. By D. T. MacDougal. *Sketch-map.*

See April number, p. 447.

United States—Colorado River. *B. American G.S.* **39** (1907): 705–729. **MacDougal.**

The desert basins of the Colorado delta. By D. T. MacDougal. *Maps and Illustrations.*

Noticed in the April number, p. 446.

United States—Georgia. *Science* **27** (1908): 71–74. **Veatch.**

Altamaha formation of the coastal plain of Georgia. By Otto Veach.

United States—Georgia and South Carolina. **Johnson.**

P. Boston S. Nat. Hist. **33** (1907): 211–248.

Drainage modifications in the Tallulah district. By Douglas Wilson Johnson. *Sketch-map, Diagrams, and Illustrations.*

United States—Hydrology. **Parker and others.**

U.S. Geol. Surv., Water-supply Paper **192** (1907): pp. vi. and 364.

The Potomac river-basin. By H. N. Parker, B. Willis, R. H. Bolster, W. W. Ashe, and M. C. Marsh. *Maps and Illustrations.*

Deals with the geographical development of the river-system, the relation of surface features to water-supply, etc.

United States—Magnetic Observations. **Faris.**

U.S. Coast and Geodetic Surv. Rep., 1907 (1908): 155–230.

Results of magnetic observations made by the Coast and Geodetic Survey between July 1, 1906, and June 30, 1907. By R. L. Faris.

United States—Nevada. *J. Franklin I.* **165** (1908): 1–26. **Carter.**

Nevada, the Silver State, and Government in Nevada. The Trucker-Carson Project. By Prof. Oscar C. S. Carter. *Map and Illustrations.*

United States—Oklahoma, etc. *U.S. Bureau Census, B.* **89** (1907): pp. 44. ——

Population of Oklahoma and Indian Territory, 1907. *Map.*

United States—Population. ——

U.S. Bureau of the Census, Bulletin 71. Estimates of population, 1904, 1905, 1906, including the census returns of states making an intercensal enumeration. Washington, 1907. Size 11½ × 9, pp. 28.

United States, South-West. **Krause.**

Abh. K. Leopoldinisch-Carolinischen A. **87** (1907): 1–226.

Die Pueblo-Indianer: eine historisch-ethnographische Studie. Von Fritz Krause. *Map and Illustrations.*

United States—Utah. *B. American G.S.* **40** (1908): 12–17. **Atwood.**

Lakes of the Uinta Mountains. By Wallace W. Atwood. *Illustrations.*

CENTRAL AND SOUTH AMERICA.

Argentine—Entre Rios. *An. S. Cient. Argentina* **64** (1907): 129–150. **Torres.**

Informe sobre la exploración arqueológica al delta del Paraná, y sur de Entre Ríos. Por Luis María Torres. *Sketch-map and Illustrations.*

Bolivia. *An. G.* **17** (1908): 71–78. **Vaudry.**

Dans l'Orient bolivien: notes sur les provinces de Chiquitos et de Velasco. Par J.-B. Vaudry. *Map and Illustrations.*

Brazil. ——

The United States of Brazil. London: Office of the *Sphere*, [1907]. Size 12 × 8½, pp. 64. *Map and Illustrations.*

Brazil—Ethnology. *Abh. K.A.W. München* **24** (1907): 1–148. **Ranke.**
Anthropologische Beobachtungen aus Zentralbrasilien. Von Ernst Ranke. *Diagrams.*

Brazil—Ethnology. *Globus* **93** (1908): 37–43. **Koenigswald.**
Die Botokuden in Südbrasilien. Von Gustav von Koenigswald. *Illustrations.*

Brazil—São Paulo. **Cardoso.**
Commissão geographica e geologica do Estado de S. Paulo. Relatorio apresentado ao Exmo. Sr. Dr. Carlos Botelho, M. D. Secretario da Agricultura, por João Pedro Cardoso. Anno de 1906. São Paulo, 1907. Size 9 × 6, pp. 30. *Maps and Illustrations.*
Report on the progress of the surveys, etc.

Brazil—S. Paulo. ———
Commissão geographica e geologica do Estado de S. Paulo. Exploração do Rio Peixe. São Paulo, 1907. Size 18 × 13, pp. 16. *Maps and Illustrations.*

AUSTRALASIA AND PACIFIC ISLANDS.

Aru Islands. *Ts. K. Nederland. Aardr. Genoots.* **25** (1908): 77–93. **Patot.**
Een viertal tochten door het eiland Tĕrangan (Aroe-Eilanden) in Maart en April 1907. Door J. W. Tissot van Patot. *Map.*

New Guinea—Dutch. *Ts. K. Nederland. Aardr. Genoots.* **25** (1908): 133–144. **Rouffaer.**
De terugkeer en afloop der Lorentz-expeditie naar centraal Ned. Nieuw-Guinea. Door G. P. Rouffaer. *Map.*
Noticed in the Monthly Record, April, p. 447.

New Guinea—Dutch. *Ts. K. Nederland. Aardr. Genoots.* **25** (1908): 122–125. **Palot.**
Is de Suopi aan Nieuw-Guinea's noordwestkust soms de bovenloop der Sĕbjar, die uitmondt in de Maccluer-golf? Door A. Tissot v. Palot. *Sketch-map.*
Discusses the termination of the Suopi river.

New Guinea—Ethnology. **Pöch.**
Einige bemerkenswerte Ethnologika aus Neu-Guinea. Von Dr. Rudolf Pöch. (Separatabdruck aus Band xxxvii. der Mitteilungen der Anthropologischen Gesellschaft in Wien.) Vienna, 1907. Size 11 × 7½, pp. 57–71. *Illustrations.*

New Guinea—German. *Globus* **93** (1908): 139–143, 149–155, 169–173. **Pöch.**
Reisen an der Nordküste von Kaiser Wilhelmsland. Von Dr. Rudolf Pöch. *Sketch-map and Illustrations.*

New South Wales—Geology. **David.**
Memoirs of the Geological Survey of New South Wales. Geology, No. 4. The Geology of the Hunter River Coal-measures, New South Wales. By T. W. Edgeworth David. Part i. Sydney, 1907. Size 12 × 10, pp. xx. and 372. *Maps (in separate case, size* 12½ × 10), *Sections, and Illustrations.*

New Zealand—Alps. *Alpine J.* **24** (1908): 67–79. **Mannering.**
The Godley Glacier and Sealy Pass, New Zealand. By G. E. Mannering. *Map and Illustrations.*
Account of a journey in 1892 in a portion of the New Zealand Alps, which has since been little visited.

New Zealand—Geology. **Fraser and Adams.**
New Zealand Geol. Surv., B. **4** (1907): pp. x. and 154.
The Geology of the Coromandel subdivision, Hauraki, Auckland. By Colin Fraser, assisted by James Henry Adams. *Maps and Illustrations.*

Pacific Islands. *Abrégé B.S. Hongroise G.* **35** (1907): 180–186. **Vojnich.**
Reisen im Vulkangebiete Oceaniens. Von Oskár Vojnich. (*Földrajzi Közlemények* **35** (1907): 446–453.) *Illustrations.*

Pacific Ocean—Historical. **Dahlgren.**
Voyages françaises à destination de la Mer du Sud avant Bougainville (1695–1749). Par E. W. Dahlgren. (Extrait des *Nouvelles Archives des Missions Scientifiques*, tome 14.) Paris, 1907. Size 9½ × 6½, pp. 423–568.

Western Australia—Census. ———
Seventh Census of Western Australia, taken for the night of March 31, 1901.

Compiled under the direction of Malcolm A. C. Fraser. 3 vols. Perth, 1904. Size 13 × 8. *Maps (forming vol. 3) and Diagrams.*

POLAR REGIONS.

Antarctic—Glaciation. *La G., B.S.G. Paris* **16** (1907): 385–401. **Rabot.**

La glaciation antarctique, d'après les observations des récentes expeditions. Par Charles Rabot. *Illustrations.*

Arctic. **Isachsen.**

Plan for en ny polar ekspedition. Af Gunnar Isachsen. [Christiania, 1908.] Size 9½ × 6½, pp. 4. *Map.*

Arctic—Bennett Island. *B. Imp. Russ. G.S.* **42** (1906): 487–519. **Kolchak.**

The last expedition to Bennett Island, sent by the Academy of Sciences in search of Baron Toll. By A. Kolchak. *Illustrations.* [In Russian.]

Arctic Ocean. ———

Meteorological and Hydrographical Observations made during the summer of 1905 on the steamship *Pakhtusof* in the Arctic Ocean. Publication of the Chief Hydrographical Department. St. Petersburg, 1907. Size 11 × 8½, pp. vi. and 90. [In Russian.]

Arctic Ocean. *B.I. Oceanogr. Monaco* **112** (1908): pp. 22. **Richard.**

Observations de température des eaux marines arctiques faites pendant les campagnes du yacht *Princesse-Alice* (1906–07). Par le Dr. Jules Richard. *Maps.*

Arctic Ocean—Ice. *B.I. Océanogr. Monaco* **114** (1908): pp. 8. **Isachsen.**

Les glaces autour de Spitsberg en 1907. Par Gunnar Isachsen. *Map.*

Arctic Ocean—Ice. *Norske G.S. Aarbog* **18** (1906–07): 119–125. **Isachsen.**

Isforholdene omkring Spitsbergen, 1907. Af Gunnar Isachsen. *Map.*

Arctic Ocean—Ice. **Garde.**

The state of the Ice in the Arctic seas, 1907. Prepared by V. Garde. [Copenhagen, 1908.] Size 12 × 9½, pp. 18. *Map.*

The popular impression of the generally unfavourable character of 1907 as regards Arctic ice is only partially justified.

Arctic Ocean—Seals. **Hjort and Knipovich.**

Conseil Explor. de la Mer, Rapports et P.-V. **8** (1907): pp. 126.

Bericht über die Lebensverhältnisse und den Fang der nordischen Seehunde. Erstattet von Dr. Joh. Hjort und Dr. N. Knipowitsch. *Maps and Illustrations.*

Arctic—Spitsbergen. *Norske G.S. Aarbog* **18** (1906–07): 87–118. **Isachsen.**

Spitsbergenekspeditionen, 1906. Af Gunnar Isachsen. *Maps and Illustrations.*

This expedition was briefly described in vol. **29**, p. 462.

Greenland—Disko Island. *G. Ts., Copenhagen* **19** (1907–08): 70–73. **Porsild.**

Foreløbig Beretning om Rejsningen af den danske arktiske Station. Af Morten P. Porsild.

Polar Regions. *G.Z.* **13** (1907): 465–478, 557–568, 614–627, 676–687. **Nordenskjöld.**

Ueber die Natur der Polarländer. Von Otto Nordenskjöld.

Polar Regions—Climate. *Rev. G. Col. y Mercantil, Madrid* **5** (1908): 14–19. **Sobral.**

Cambio de clima en las regiones polares. Por José G. Sobral.

Spitsbergen—Geodesy. *Ymer* **27** (1907): 375–407. **Carlheim-Gyllensköld.**

Svenska gradmätningsexpeditionens fysikaliska, meteorologiska och naturhistoriska arbeten. Af V. Carlheim-Gyllensköld. *Illustrations.*

MATHEMATICAL GEOGRAPHY.

Cartography—Scales. **Pollacchi.**

Les échelles métriques des cartes géographiques, topographiques et marines; et règle graduée, supprimant les calculs de ces échelles. Par le Capt. P. Pollacchi. Paris: R. Chapelot et Cie., 1907. Size 8½ × 5½, pp. 32. *Price 1s. 3d.*

Measurement of Distances. *Deutsche Rundschau G.* **30** (1908): 148–151. **Habenicht.**
Das Velometer, ein verbesserter Entfernungsmesser. Von H. Habenicht. *Illustr.*
The machine is a specially arranged bicycle with cyclometer.

Sextant-Observations. *Ann. Hydrographie* **36** (1908): 75–83. **Möller.**
Ueber die Verwendung von Sterndistanzen zur Bestimmung der Sextantenfehler auf See. Von Dr. Johannes Möller. *Diagrams.*

Surveying. *P.I. Civil Engineers* **170** (1907): 315–323. **Cuffe.**
Survey of inaccessible places by tacheometry. By O. F. L. W. Cuffe. *Sketch-maps and Illustrations.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Climatology. *G.Z.* **13** (1907): 688–694. **Schubert.**
Landsee und Wald als Klimatische Faktoren. Von J. Schubert. *Diagram.*

Climatology. **Du Faur.**
The effect of polar ice on the weather. By E. Du Faur. (From the *Journal and Proceedings of the Royal Society of New South Wales*, vol. 41.) [Sydney, 1908.] Size 8½ × 5½ pp. 176–189. *Facsimile Map and Illustrations.*

Earthquakes and Architecture. *An. S. Cient. Argentina* **64** (1907): 5–87. **Selva.**
Edificación contra tremblores. Por Domingo Selva. *Illustrations.*

Geomorphology—Rivers. *Geol. Mag.*, Dec. V. **5** (1908): 108–112. **Ellis.**
Windings of rivers. By T. S. Ellis. *Sketch-maps.*

Geophysics. *Atti R.A. Lincei, Rendiconti* **16** (1907): 2 Sem. 910–916. **Marchi.**
La teoria elastica dell' isostasi terrestre. Di Luigi de Marchi.

Ice-forms. *Z. Ges. E. Berlin*, 1908: 95–115. **Hauthal and others.**
Die Schmelzformen des Firns im tropischen und subtropischen Hochgebirge. Von Dr. R. Hauthal, Prof. Dr. Hans Meyer, Dr. Fritz Jaeger u.a. *Illustrations.*
See note in the April number (p. 449).

Limnology. *Verhandl. XVI. Deuts. G.-tages, Nürnberg* (1907): 319–333. **Halbfass.**
Inwieweit kann die Seenkunde die Lösung Klimatologischer Probleme fördern? Von Prof. Dr. W. Halbfass.

Meteorology. **Arctowski.**
Recherches sur la périodicité des phénomènes météorologiques à Bruxelles. Notice sur les variations de longue durée des amplitudes moyennes de la marche diurne de la température en Russie. Variation des amplitudes des marches diurnes de la température au sommet du Pike's Peak. Par Henryk Arctowski. (Extrait du "Bulletin de la Société Belge d'Astronomie," Année 1908.) Brussels, [1908]. Size 9½ × 6½, pp. 36. *Diagrams.*

Meteorology. **Arctowski.**
Variations de longue durée de divers phénomènes atmosphériques. Par Henryk Arctowski. (Extrait du no. 11, 1907, du "Bulletin de la Société belge d'Astronomie.) Brussels, [1907]. Size 9½ × 6½, pp. 14. *Diagrams.*

Meteorology—Anti-trades. *Ann. G.* **17** (1908): 1–16. **Brunhes.**
Le contre-alizé. Par Bernard Brunhes. *Diagram.*

Meteorology—Circulation. **Arctowski.**
De l'influence de la lune sur la vitesse du vent aux sommets du Saentis, du Sonnblick et du Pike's Peak. Par Henryk Arctowski. (Extrait du no. 12, 1907, du "Bulletin de la Société Belge d'Astronomie.") Brussels, [1907]. Size 9½ × 6½, pp. 14. *Diagrams.*

Meteorology—Clouds. **Leyst.**
Ueber Schätzung der Bewolkungsgrade. Von Prof. Dr. Ernst Leyst. [From *Bulletin des Naturalistes de Moscow*, Nos. 3 and 4, 1906.] Moscow, 1906. Size 10 × 6½, pp. 217–269.

Meteorology—Precipitation. *M. k.k. G. Ges. Wien* **50** (1907): 139–164. **Kerner.**
Revision der zonaren Niederschlagsverteilung. Von Dr. Fritz v. Kerner.

Meteorology—Pressure. *Ann. Hydrographie* **35** (1907): 496–500. **Baschin.**
Die Verteilung des Luftdrucks über den Ozeanen. Von Otto Baschin.

Meteorology—Solar Radiation. **Newcomb.**
T. American Philosophical S. **21** (1908): 309–387.
A search for fluctuations in the sun's thermal radiation through their influence on terrestrial temperature. By Simon Newcomb.

Meteorology—Spectre of the Brocken. *Meteorologische Z.* **25** (1908): 19–25. **Richarz.**
Ueber Beobachtungen des kunstlichen Brockengespenstes. Von F. Richarz. *Diagrams.*

Meteorology—Upper Atmosphere. *Ann. Hydrographie* **36** (1908): 63–66. **Schlenzka.**
Fesselballonaufstiege für meteorologische Höhenforschung an Bord S.M.S. *Planet.* Von Oberleutnant Schlenzka. *Illustrations.*

Oceanography—Arctic Ocean. *B.S.R. Belge G.* **31** (1907): 462–467. **Denucé.**
La seconde expédition polaire allemande, 1869–1870. Une liste inédite de sondages d'eau de mer profonde, du Capitaine Hegemann. Par J. Denucé.

Oceanography—Arctic Ocean. **Poliloff.**
Sketch of the work of the hydrographical expedition to the northern polar ocean, in its meteorological, hydrographical, and medical aspects. By D. Poliloff. (Supplement to 'Memoirs on Hydrography,' vol. **27**.) St. Petersburg, 1906. Size 10½ × 7, pp. 132. *Map.* [In Russian.]

Oceanography—Atlantic. *Petermanns M.* **54** (1908): 16–19. **Schott.**
Salzgehalt und Dichte der Meeresoberflache in den westindischen Gewässern. Von Prof. Dr. Gerhard Schott. *Maps.*

Oceanography—Atlantic. **Nielsen.**
Meddelelser Kom. Havundersøgelser, Copenhagen; Hydrografi **1** (1907): No. 9, pp. 26.
Contribution to the hydrography of the north-eastern part of the Atlantic Ocean. By J. N. Nielsen. *Map and Sections.*

Oceanography—Baltic. ——
Conseil Explor. de la Mer; Rapports et P.-V. **9** (1908): pp. 120.
Bericht über die Tätigkeit der Kommission C. 1. (Geschäftsführer Dr. Filip Trybern) in der Periöde Februar 1903—Juli 1907. *Map.*
On investigations into the life-conditions and migrations of fish.

Oceanography—Baltic—Currents. **Pettersson.**
Strömstudier vid Östersjöns portar. Af O. Pettersson. [German *résumé.*] Göteborg, 1908. Size 18 × 12½, pp. 16 and x. *Sketch-map, Sections, and Illustrations. Presented by the Author.*

Oceanography—North Atlantic. **Hjort.**
Some results of the International ocean research. By Dr. Johan Hjort. Edinburgh: The Scottish Oceanographical Laboratory, 1908. Size 10 × 6, pp. 40. *Sketch-maps, Illustrations, and Diagrams. Price* 1*s. Presented by the Publishers.*

Oceanography—North Atlantic. *Ann. Hydrographie* **35** (1907): 506–513. **Brennecke.**
Die dänischen hydrographischen Untersuchungen im Nordatlantischen Ozean, 1903–1905. Von Dr. W. Brennecke. *Map and Sections.*

Oceanography—North Sea. *Ann. Hydrographie* **36** (1908): 1–5. **Perlewitz.**
Ozeanographische Versuche und Beobachtungen an Bord S.M.G. *Möwe* und S.M.S. *Zieten* im Sommer 1907. Im amtlichen Auftrage von Dr. P. Perlewitz. *Diagram.*

Oceanography—Red Sea. **Crossland, Herdman, and others.**
J. Linnean S., Zoology, **31** (1907): 1–44.
Reports on the marine biology of the Sudanese Red sea, from collections made by Cyril Crossland. With an introduction by Dr. W. A. Herdman. *Map and Illustrations.*
Mr. Crossland supplies a narrative of the expedition, and discusses the shore-cliff near Alexandria, and the recent history of coral reefs in the Red sea (*cf.* vol. **31**, p. 566).

Seismology. **Rudolph and Tams.**
Seismogramme des nordpazifischen und südamerikanischen Erdbebens am 16. August, 1906. Auf Beschluss der Permanenten Kommission der Internationalen Seismologischen Assoziation herausgegeben. . . . [*Reproductions of* 58 *seismograms, in case,* 18 × 13.] Begleitworte und Erläuterungen, von E. Rudolph and E. Tams. Size 11 × 7, pp. 98. *Map.* Strassburg, 1907. *Presented by the Association through Major L. Darwin.*

Seismology. *Nineteenth Century* **63** (1908): 144–150. **Gill.**

Some recent earthquake theories. By Rev. H. V. Gill.

Seismology. **Rosenthal.**

Veröffentlichungen des Zentralbureau des Internationalen Seismologischen Assoziation, Serie B. Katalog der im Jahre 1904 registrierten seismischen Störungen. Zusammengestellt von Elmar Rosenthal. Strassburg, 1907. Size 11 × 7½, pp. xii. and 146. *Presented by the Association through Major L. Darwin.*

Volcanoes. **Brun.**

Quelques recherches sur le volcanisme. Par Albert Brun. 2 parts. (Extraits des Archives des Sciences physiques et naturelles, mai et juin, 1905, et Novembre, 1906.) [Geneva, 1905–06.] Size 9 × 6, pp (part i.) 30; (part ii.) 24. *Illustrations.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. ——

Geography and architecture. (From the *Building News*, London, October 4, 1907.) Size 12½ × 8½, p. 449. [1 sheet.]

Noticed in the May number (p. 571).

Anthropogeography. *B. American G.S.* **40** (1908): 7–11. **Ward.**

Some problems of the tropics. By Robert De C. Ward.

On various questions bearing on the economic development of tropical regions.

Anthropogeography. *B. Imp. Russ. G.S.* **42** (1906): 649–782. **Voeikof.**

The distribution of population ever the Earth's surface in its relation to natural conditions and commercial activity. By A. J. Voeikof. *Maps and Diagram.* [In Russian.]

Anthropogeography. **Schlüter.**

Verhandl. XVI. Deuts. G.-tages, Nürnberg (1907): 304–318.

Ueber des Verhältnis von Natur und Mensch in der Anthropogeographie. Von Dr. Otto Schlüter.

Anthropogeography. **Hettner.**

Verhandl. XVI. Deuts. G.-tages, Nürnberg (1907): 273–303.

Die Geographie des Menschen. Von Prof. Dr. Alfred Hettner.

Anthropogeography. *B.S. Neuchatel. G.* **18** (1907): 166–183. **Clerget.**

Introduction géographique à l'étude de l'économie politique. Par Pierre Clerget.

Anthropogeography—Population. *G.Z.* **13** (1907); 657–676. **Voeikof.**

Die natürliche Vermehrung der Bevölkerung, ihre geographische Verteilung, Vergangenheit und Zukunft. Von Alexander Woeikow. *Maps.*

Anthropogeography—Towns. **Oberhummer.**

Verhandl. XVI. Deuts. G.-tages, Nürnberg (1907): 66–101.

Der Stadtplan, seine Entwickelung und geographische Bedeutung. Von Prof. Dr. Eugen Oberhummer. *Facsimile plans.*

Commercial. *Scottish G. Mag.* **24** (1908): 133–141. **Angus.**

The geographical distribution of labour. By H. Crawford Angus.

Commercial. *Scottish G. Mag.* **24** (1908): 113–132. **Chisholm.**

Economic geography. By George G. Chisholm. *Portrait, Maps, and Diagrams.*

Commercial—Mines. ——

Mines and Quarries: General Report and Statistics for 1905. London, 1906–1907. Size 13 × 8½, pp. 498. *Map and Diagrams. Presented by the Home Office.*

Commercial—Rubber. *B.S.G. de l'Est* **28** (1907): 428–447. **Wildeman.**

La géographie du caoutchouc et son exploitation. Par E. de Wildeman.

Historical. *Ts. K. Nederland. Aard. Genoots.* **25** (1908): 125–133. **Niermeyer**

Dapper en Montanus. Door J. F. Niermeyer.

A trenchant criticism of the strange theory put forward by Mr. Schuller (*Journal*, vol. **30**, p. 568).

Historical—Early Voyages. *Norske G.S. Aarbog* **18** (1906–07): 20–32. **Isachsen.**
Nordboernes faerder til Norderseta. Af G. Isachsen. *Maps.*
The writer thinks that traces of the early voyages of the Northmen were found by the second *Fram* Expedition in the Arctic archipelago. (Cf. *Journal*, vol. **26**, p. 120.)

Historical—Indian Ocean. *J. Asiatique*, Ser. X. **10** (1907): 433–566. **Ferrand.**
Les îles Râmny, Lâmery, Wâḳwâḳ, Ḳomor des géographes arabes, et Madagascar. Par Gabriel Ferrand.

Historical—Norwegian voyage. *Norske G.S. Aarbog* **18** (1906–07): 1–29. **Isachsen.**
Om opdagelsen af Svalbard. Af G. Isachsen. Size 10 × 6½. *Map. Also separate copy.*
Svalbard was a northern land said to have been discovered in 1194.

Historical—Voyages. *B.S.G. Com. Havre* **24** (1907): 281–329. **Moulin.**
Aventures des Marins Dieppois. Histoire des découvertes maritimes, des exploits militaires, des travaux scientifiques, des sauvetages dus aux navigateurs de Dieppe. Par Alfred Moulin. *Sketch-maps.*

History of Geography. *Norske G.S. Aarbog* **18** (1906–07): 71–86. **Jacobsen.**
Et afsnit af geografiens historie, 1800–1830. Af Birger Jacobsen.

BIOGRAPHY.

Lopez. **Marcel.**
Le géographe Thomas Lopez et son œuvre: essai de biographie et de cartographie. Par Gabriel Marcel. (Extrait de la *Revue Hispanique*, tome **16**.) New York, etc., 1907. Size 10 × 6½, pp. 114. *Presented by the Author.*
On the work of this Spanish cartographer (eighteenth and nineteenth centuries).

Oscar II. *Ymer* **27** (1907): 307–313. **Nathorst.**
Konung Oscar II. och den geografiska forskningen. Af A. G. Nathorst. *Also separate copy.*

Scherer. *M.G. Ges. München* **2** (1907): 1–40. **Sandler.**
Ein bayerischer Jesuitengeograph. Von Chr. Sandler. *Facsimile Maps and Illustrations.*
Heinrich Scherer, the subject of this memoir, was born in 1628.

Scherzer. ———
Dr. Karl Ritter von Scherzer. Eine biographische Skizze herausgegeben vom Komitee zur Errichtung eines Dr. Karl Ritter von Scherzer-Denkmales in Wien. Vienna, 1907. Size 8 × 5½, pp. 32. *Portrait.*

GENERAL.

Alpine Club. *Alpine J.* **24** (1908): 15–29. **Pilkington.**
Fifty years of the Alpine Club. By Charles Pilkington.

Educational. **Jefferson.**
World diagrams of population, temperatures, rainfall, and plant distribution. A Supplement to 'Teacher's Geography.' By Mark Jefferson. Ypsilanti, Mich., 1908. Size 10¼ × 8, pp. 57–82. *Maps.*
The diagrams here reproduced, with notes, have been used by the writer in his educational courses.

Educational. ———
Board of Education. Suggestions for the consideration of teachers and others concerned in the work of Public Elementary Schools. London, 1905. Size 9¼ × 6, pp. 156.
There are some excellent hints on the teaching of geography.

Educational. *J.G.* 6 (1907): 145–150. **Brown.**
An experiment on the size of the Earth. By Robert Marshall Brown. *Sketch-map and Diagrams.*
On a practical method of determining the size of the Earth for educational purposes.

Geographical Knowledge. *Contemporary Rev.* **93** (1908): 171–181. **Walpole.**

The growth of the world. By the late Sir Spencer Walpole.

On the gradual enlargement of the known world.

Geography. *Verhandl. XVI. Deuts. G.-tages, Nürnberg* (1907): 51–65. **Tiessen.**

Beobachtende Geographie und Länderkunde in ihrer neueren Entwickelung, nebst einem Wort zum 25-jährigen Bestehen der Zentralkommission für wissenschaftliche Landeskunde von Deutschland. Von Dr. E. Tiessen.

German Colonies.

Jahresbericht über die Entwickelung der Schutzgebiete in Afrika und der Südsee im Jahre 1906–07. (Beilage zum Deutschen Kolonialblatt, 1908.) 8 parts and "Anhang." Berlin, 1908. Size 12 × 9. *Sketch-maps, Illustrations, and Diagrams.*

German Colonies—Surveys. *Z. Kolonialpolitik* **10** (1908): 15–25. **Kohlschütter.**

Koloniale Landsvermessung. Von Dr. E. Kohlschütter.

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Austria—Vienna. **Rothaug.**

Karte der Umgebung von Wien. Bearbeitet von J. G. Rothaug. Scale 1 : 30,000 or 2·1 inches to a stat. mile. 6 sheets. Vienna: G. Freytag & Berndt, [1908]. *Presented by the Publishers.*

A large wall-map of the environs of Vienna coloured on the stereoscopic system, similarly with other maps lately published by Messrs. Freytag & Berndt. The high lands stand out well in relief, but the colouring for the lowlying districts is not quite so successful. Contour-lines at intervals of 20 metres can be clearly followed upon close inspection.

British Isles—England and Wales. **Ordnance Survey.**

Sheets published by the Director-General of the Ordnance Survey, Southampton, from May 1 to 30, 1908.

1-inch (third edition):—

In outline, 113, 114, 141, 166. 1*s. each* (engraved).

Large-sheet series, printed in colours, folded in cover or flat in sheets, 85, 86. *Price, on paper,* 1*s.* 6*d.*; *mounted on linen,* 2*s.*; *mounted in sections,* 2*s.* 6*d. each.*

6-inch—County Maps:—

Cornwall (First Revision), 50 N.E., 61 S.W., 65 S.W., 66 N.W., 70 S.E., 77 S.E., 80 N.E., (84 S.E. and 90 N.E.). **Kent** (Second Revision), 26 S.W., 34 S.E., 35 N.W., 36 N.W., S.E., 37 N.W., 45 S.E., 46 N.W., S.E., 47 S.E., (48 S.E. and 48*a* S.W.), 55 N.E., S.E., 56 N.E., S.W., S.E. **Lancashire** (First Revision of 1891 Survey), 108 S.W., 111 N.E. **Lincolnshire** (First Revision), 5 N.E., S.E., 6 S.W., 7 S.W., 8 N.W., S.W., 10 S.W., 11 S.W., 12 S.W., 13 N.W., S.W., (15 S.W. and 23 N.W.). **Pembrokeshire** (First Revision), 4 (N.W. and S.W.), 9 N.W., S.E., 22 S.E., 27 N.W., S.W. **Yorkshire** (First Revision of 1891 Survey), 229 N.E., S.E., 230 N.E., 235 S.W., 236 N.W., N.E., S.E., 246 N.W., 253 N.E. 1*s. each.*

25-inch—County Maps:—

Hampshire (Second Revision), LXXXIX. (10 and 9), 11, (13 and part of LXXXVIII. 16), 14, 15; XCIII. 8, 16; XCIV. 9, 16; XCVII. 11, 16. **Kent** (Second Revision), V. 11; XII. 14; XX. 3, 7, 11; XXXII. 2, 3; LII. 6, 7, 8, 10, 11, 12; LIII. 5, 9; LXX. 6, 8, 11, 12; LXXI. 5; LXXIX. 6, 7, 8, 11, 12, 16; LXXX. 9, 13. 3*s. each.* LXXVIII. 5; LXXIX. 14, 15; LXXXIIa. 4; LXXXIII. 1. 1*s.* 6*d. each.* **Lancashire** (First Revision of 1891 Survey), C. 2, 3, 4, 7, 8, 9, 10, 16; CIII. 5, 9, 13, 14, 15, 16; CIV. 11, 12, 14, 15; CVI. 11, 16; CVII. 4, 6, 7, 8; CX. 1, 2, 3; CXIII. 7, 8. **Pembrokeshire** (First Revision), XXXIII. 16; XXXIX. 3, 14; XL. 10; XLII. 1, 2, 4, 5, 6, 7, 8, 9, (10 and 14), 12, (14 and 10), (16 and part of 15); XLIII. 2, 5, 6, 10. **Yorkshire** (First Revision of 1891 Survey), CCIII. 4; CCIV. 6, 7, 11, 12, 14, 15, 16; CCV. 1, 2, 3, 4, 7, 11; CCVI. 2, 5, 6, 9, 10, 13, 15; CCXV. 1, 2; CCXVI. 7, 13, 14, 15, 16; CCXVII. 6, 7, 9, 10, 11, 12, 13, 14, 15; CCXXXII. 1, 2; CCXXXIII. 2, 4.

E. Stanford, London Agent.

British Islands—England and Wales. **Geological Survey.**

4 miles to 1 inch:—

New Series, printed in colours. Solid edition. Sheet 14, Aberystwyth, Carmarthen, Hereford, etc. *Price* 2*s.* 6*d.*

(*E. Stanford, London Agent.*)

British Isles—England and Wales. **Royal Commission on Canals and Waterways.**

Map of the Canals and Navigable Rivers in the catchment basins of England and Wales. Scale 1:633,600 or 1 inch to 10 stat. miles. 2 sheets.—Map of the Canal Systems and Navigable Rivers of England and Wales, showing railway owned, railway controlled, and independent canal systems and tidal working of navigable rivers. Scale 1:633,600 or 1 inch to 10 stat. miles. 2 sheets. London: Royal Commission on Canals and Waterways, 1908. *Presented by the Royal Commission on Canals and Waterways.*

Two maps, with indexes, recently prepared for the report of the Royal Commission on Canals and Waterways. The first (Plate No. 4) shows the canals comprised in one system by the same colour, and adjoining systems in different colours. Derelict canals and canals converted into, or sites used for, railways are shown by different symbols. Catchment basins are clearly indicated by colour-tinting. This map has been finally revised and corrected, and is intended to take the place of the earlier edition previously issued.

The second map (Plate No. 5) is entirely new, and shows canals and waterways of the country arranged according to their ownership and relative widths. Both maps are in two sheets, and consist of a faintly printed outline impression of the 10-miles-to-an-inch Ordnance Survey map of England and Wales, with the special information superimposed boldly in colour.

British Isles—Scotland. **Bartholomew.**

Pedestrians' map of Edinburgh district and Pentland Hills. By John Bartholomew, F.R.G.S. Scale 1:15,840 or 4 inches to 1 stat. mile. Edinburgh: John Bartholomew & Co., [1908]. *Price, mounted in cloth, 2s. net. Presented by the Publisher.*

Shows height of land by colour-tinting and contours, in Messrs. Bartholomew's well-known clear style.

France. **Ministre de l'Intérieur, Paris.**

Carte de la France dressée par ordre du Ministre de l'Intérieur. Scale 1:100,000 or 1 inch to 1·6 stat. miles. Sheets: III.–15, Brest; XIII.–17, St. Calais; XIV.–18, Blois (Ouest); XVI.–13, Paris (Ouest); XVII.–29, Aurillac; XVII.–34, Lacaune; XIX.–21, Decize; XIX.–33, Le Vigan; XX.–16, Ervy; XX.–20, Château-Chinon; XX.–26, Montbrison; XX.–33, St. Hippolyte-du-Fort; XXI.–23, Mâcon (Ouest); XXI.–28, Tournon. Paris: Ministère de l'Intérieure, 1907–08. *Price* 0.80 *fr. each sheet.*

These are new editions.

France. **Service Géographique de l'Armée, Paris.**

Carte des Chemins de Fer Français. Scale 1:800,000 or 1 inch to 12·6 stat. miles, 4 sheets. Paris: Service Géographique de l'Armée, 1907. *Price* 1.50 *fr. each sheet.*

Norway. **Norges Geografiske Opmaaling.**

Topografisk kart over kongeriget Norge. Scale 1:100,000 or 1 inch to 1·6 stat. mile. Sheets: L. 9, Lödingen; T. 5, Kaafjord.—Kristiania Omegen. Scale 1:25,000 or 2·5 inches to 1 stat. mile. Sheet IV. Christiania: Norges Geografiske Opmaaling, 1907–08. *Presented by the Norwegian Geographical Institute.*

ASIA.

Malay Archipelago. **Topographische Inrichting, Batavia.**

Overzichtskaart van den Oost-Indischen Archipel. Scale 1:2,500,000 or 1 inch to 39·5 stat. miles. 6 sheets. Batavia: Topographische Inrichting, 1908.

A good general map of the East Indian archipelago, well drawn, and carefully printed in colours. It is important as showing, as far as the scale will admit without overcrowding, the results of the latest explorations and surveys in the Netherland possessions. An index of place-names accompanies the map as a separate pamphlet, which will be useful for reference.

AFRICA.

Cape Colony. **Cape Geological Commission.**

Geological map of the Colony of the Cape of Good Hope. Scale 1:328,000 or 1

inch to 3·7 stat. miles. Sheets: 49, Kuruman; 50, Vryburg. Cape Town: Geological Commission, 1908. *Price 2s. 6d. each sheet. Presented by the Director, Geological Survey of the Cape of Good Hope.*

These are two adjoining sheets, extending westward from the Transvaal boundary to the Kuruman river, and from lat. 26° 30′ to 27° 40′ S. The geological features are well shown in colours, and useful sections are given on the borders of the sheets.

Egypt. **Survey Department, Cairo.**

Topographical Map of Egypt. Scale 1:50,000 or 1·3 inch to 1 stat. mile. Sheets: N.W. II.–I. S.W. IX.–I., IX.–II.—Topographical map of Qaliubia Province. Scale 1:10,000 or 6·3 inches to 1 stat. mile. Sheets: N.E. 9–4, 9–6, 10–4, 10–5, 10–6, 11–4. Cairo: Survey Department, 1908. *Presented by the Director-General, Survey Department, Cairo.*

Gold Coast. **Guggisberg.**

Map of the Gold Coast. Published by the authority of Sir John Pickersgill Rodger, K.C.M.G., Governor, under the direction of Major F. G. Guggisberg, R.E., F.R.G.S., Director of Surveys, Gold Coast. Scale 1:125,000 or 1 inch to 1·9 stat. mile. Sheets: 73-G–I., Wupe; 73-G–III. Akuse. Edinburgh and London: W. & A. K. Johnston, Ltd., 1908. *Price 2s. each sheet. Presented by Major F. G. Guggisberg, R.E., Director of Surveys, Gold Coast.*

These two sheets show the course of the Volta and the country immediately to the east from lat. 6° N. to 6° 45′ N.

AMERICA.

Canada. **Department of the Interior, Ottawa.**

Standard Topographical Map of Canada. Scale 1:250,000 or 1 inch to 3·9 stat. miles. Sheet 2 S.W. and part of 9 S.W., Toronto and Muskoka. Ottawa: Department of the Interior, 1907. *Presented by James White, Esq., Geographer, Department of the Interior, Ottawa.*

Canada. **Dept. of the Interior, Ottawa.**

Railway map of the Dominion of Canada. Scale 1: 2,217,600 or 1 inch to 35 stat. miles. 8 sheets. Ottawa: Department of the Interior, 1907. *Presented by James White, Esq., Geographer, Department of the Interior, Ottawa.*

A large-scale map of the Dominion of Canada printed in colours, without hill shading, upon which most complete information is given concerning railways, by means of various colours and symbols. Lines projected and under construction are clearly distinguished from working lines. Several useful tables appear on the map, one of the distance in miles from Montreal, Winnipeg, and Vancouver to important places in Canada; another gives the names of the different railways, each with a reference number corresponding to that affixed to the line on the map; whilst a third gives the mileage of lines completed and under construction, rolling stock, receipts for 1905–06, cost of maintenance and operation, 1905–06, and the total cost. This map is most important to all interested in the development of the Dominion, and it is evident that Mr. J. White has spared no pains to make it as complete as possible.

AUSTRALASIA.

Australasia. **Mackinder.**

Stanford's new orographical map of Australasia. Compiled under the direction of H. J. Mackinder, M.A. Scale 1: 5,385,600 or 1 inch to 85 stat. miles. 4 sheets. London: Edward Stanford, 1908. *Price 16s. Presented by the Publisher.*

This map, like those of the same series previously published, shows land elevation by shades of brown and ocean depths in blue, the intervals in feet both for land and water being: sea-level to 500, 500–1000, 1000–5000, 5000–10,000, 10,000–15,000, and over 15,000. In many regions the contours can only be very approximate, as no accurate surveys exist upon which they could be based; still the map gives a very good general idea of the physical features of this part of the world as regards elevations and depressions. Political frontiers have been indicated by dotted grey lines, in which colour also the place-names are printed, so that the general effect of the tinting is not obscured.

GENERAL.

World. **Reich.**

Atlas Antiquus. By Emil Reich. London: Macmillan & Co., 1908. *Price* 10*s*. *net*. *Presented by the Publishers.*

This atlas consists in the main of a series of forty-eight outline maps, upon which are shown, in colours, the routes of all the important military expeditions by land and sea in the Mediterranean countries from Italy to Asia Minor, previous to the times of the Roman emperors. But it is not limited to Greece, Italy, and the Mediterranean shores, for there are, amongst others, maps showing the expeditions of Alexander the Great and the Roman Empire at its greatest extent. Much information is ingeniously given on the maps without overcrowding by means of clearly distinguished symbols; for instance, as regards sites of battles, + denotes "beaten by," the initial of the defeated preceding that of the victor, thus D + S = Demetrius beaten by Seleucus, as in Map XX. Each map is preceded by a page or two of concisely written notes referring to the principal events dealt with on the map. Altogether Dr. E. Reich's 'Atlas Antiquus' is a most instructive volume, and in its design differs in several respects from most historical atlases. It has been prepared on the same lines as the author's New Atlas of English History, which was published in 1903, and its chief purpose is to project historical events graphically upon the territory in which they happened, and by the configuration of which they were largely influenced. Dr. Reich states that many of the military movements indicated in the maps are not in full accordance with all the sources, but where these are very contradictory he has formed his own opinion of what was most probably the truth.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during April, 1908. *Presented by the Hydrographer, Admiralty.*

New Charts.

No.	Inches.	
2150 m =	0·24	Germany, north coast:—Giedser Odde to Bornholm. 3*s*.
3677 m =	29·0	Italy:—Port Savona. 2*s*.
3675 m =	9·5	Plans on the east shore of the Adriatic:—Port Gravosa and Ombla inlet. 2*s*.
3691 m =	7·2	Crete:—Suda bay anchorage. 2*s*.
3687 m =	0·9	Tasmania:—Albatross island to Circular head. 3*s*.

New Plans and Plans added.

2281 m =	5·6	Norway. The Naze to Karmö. New Plan:—Port Stavanger. 3*s*.
2859 m =	8·8 / 10·0	Plans on the south coast of San Domingo. New Plan:—Barahona harbour. Plan added:—Port Viejo de Azua. 2*s*.
1316 m =	3·1	Korea:—Cape Duroch to Linden point. Plan added:—Chonjin or Chung Chin bay. 3*s*.

Charts Cancelled.

No.	Cancelled by	No.
2150 Germany, north coast:—Fehmarn to Bornholm.	New chart. Giedser Odde to Bornholm	2150
157 Italy:—San Remo to Cape Cavallo. Plan of Savona on this sheet.	New Chart. Port Savona	3677
2713 Adriatic:—Curzola to Cattaro. Plan of Port Gravosa on this sheet.	New chart. Plans on the east shore of the Adriatic:—Port Gravosa and Ombla inlet	3675
2172 Alaska:—Bering strait.	—	—

Charts that have received Important Corrections.

No. 2586, Scotland:—Coastguard stations. 2587, Ireland Coastguard stations. 2297, Gulf of Bothnia:—Hangö head to South Quarken. 810, Gulf of Finland:—Hangö road and approaches. 870, Gulf of Finland:—Wormsö sound. 2227, Gulf of Finland:—Revel roadstead. 173, Gulf of Finland: Approaches to Helsingfors and Sveaborg. 2224, Gulf of Finland:—Helsingfors, Sveaborg, and parts adjacent. 2247, Gulf of Finland:—Hogland to Seskär, north shore. 2245, Gulf of Finland:—Hogland to Seskär, south shore. 74, Spain, north coast:—Portugalete and Bilbao. 157, Italy:—San Remo to Cape Cavallo. 243, Africa,

north coast:—Port of Alexandria. 3119, Africa, north coast:—Alexandria harbour. 1315, Bermuda:—The Narrows. 863, Labrador:—Hudson bay and strait. 293, Newfoundland:—Gander bay to Cape Bonavista. 761, West India islands and Caribbean sea, sheet I. 762, West India islands and Caribbean sea, sheet II. 763, West India islands and Caribbean sea, sheet III. 3344, San Domingo:—Fort Liberté, Manzanillo and Monte Cristi bays. 541, South America, east coast:—Rio de Janeiro harbour. 827, India, west coast:—Vengurla to Cape Comorin. 40, India, west coast:—Karachi harbour. 829, Bay of Bengal:—Cocanada to Bassein river. 814, Bay of Bengal:—The Sandheads, False point to Mutlah river. 821, Bay of Bengal:—Elephant point to Cheduba strait. 287, Borneo:—Gaya bay on the west to Sandakan harbour on the east. 1650, Borneo:—Mallawallé island to Lankayan. 2577, Philippine islands:—Between St. Bernardino and Mindoro straits. 389, China, north-east coast:—Shanghai harbour. 2759*a*, Australia, northern portion. 2759*b*, Australia, southern portion. 1750, Australia, south coast:—Port Adelaide. 2119, Australia, east coast:——Newcastle harbour. 780, Pacific ocean, S.W. sheet. 782, Pacific ocean, N.E. sheet. 786, Pacific ocean:—Cape Horn to Cape Corrientes. 2459, North-West Pacific ocean, including Yellow, Japan, and Okhotsk seas. 1510, Sandwich islands. 1378, Sandwich islands:—Honolulu harbour.

Indian Ocean and Red Sea. **Meteorological Office.**

Monthly meteorological charts of the Indian Ocean north of 15° S. lat. and Red Sea, June, 1908. London: Meteorological Office, 1908. *Price 6d. each. Presented by the Meteorological Office.*

North Atlantic and Mediterranean. **Meteorological Office.**

Monthly meteorological charts of the North Atlantic and Mediterranean, June, 1908. London: Meteorological Office, 1908. *Price 6d. each. Presented by the Meteorological Office.*

North Atlantic. **U.S. Hydrographic Office.**

Pilot charts of the North Atlantic Ocean, May and June, 1908. Washington: U.S. Hydrographic Office, 1908. *Presented by the U.S. Hydrographic Office.*

North Pacific. **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, June, 1908. Washington: U.S. Hydrographic Office, 1908. *Presented by the U.S. Hydrographic Office.*

Norway. **Norges Geografiske Opmaaling.**

Kystkarter: Generalkart A 1, Skagerrak. Scale 1 : 350,000 or 1 inch to 5·5 stat. miles. 2 Sheets, 1907. Specialkarter. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. B 54, Den Norske Kyst fra Lurö til Nesöen og Rödö; B 56, Den Norske Kyst fra Stött til Saltfjorden. Christiania: Norges Geografiske Opmaaling, 1908. *Presented by the Norwegian Geographical Institute.*

Position Line Chart. **Edmond.**

Edmond's Position Line Chart, on Mercator's Projection, for all Latitudes. *Presented by A. J. Vogan, Esq.*

This chart is intended to furnish the navigator with ready means of plotting the "Position line" in Sumner's method for any desired latitude. It measures 22 inches by 18 inches, and consists of a rectangular figure, up and down which are ruled one hundred parallel lines, fifty on each side of a central line or meridian. The vertical lines are spaced to minutes of longitude, and can be numbered to include the required scope of longitude.

The point where the central meridian meets the base-line of the chart is the centre of a protractor, the degrees of which are marked off on the two vertical sides and the top horizontal line of the chart. For a scale of latitude and distance a pencil line is drawn from the zero at the centre of the base to the latitude on the outside numbers of the protractor to right or left; the minutes of longitude will then cut this diagonal at minutes of latitude. Any distance or difference of latitude can be measured along this scale, and can be read off by the numbers at the base. Printed instructions are furnished with the chart.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

6°30'
7°
7°30'
6°
30'
5°
30'
RIVER NIGER
R. Anambara
Omerum Ck.
R. Enam
Jersey I.
Walker I.
Brokkedon I.
Asaba
Onitsha
Obunike
Uguide
Essi Owelli
Abaja
Omo-oje
Oba
Oroke
Olo
Obusi
Naukwa
Oba-ojata
Nkwerri
Nnubi
Aguleri
Nando
Uchalla
Amanike
Nteji
Oruni
Norgu
Ukpo
Abagana
Nankpu
Awka
Nebo
Odor R.
Umu Achu
Esu R.
Awa
Omo Nebo
Ajalli
Orio Akpo
Ndokoro
Oglunka
Novidja
Owerri
Afor Omaka
Source of the R. Imo
Otaro R.
Eke Umpologo
Eke Utura
Uria
Odidgere R.
Iboro
Okija
Munakor
Obeikwem
Ihudim
Bullock
Umpoto
Islands
Obagwi
Hawkins I.
Ogu aniocha
Onwakilo
Akri Ugidi
Ashaka
Green I.
Opari
Ogu
Egboma R.
Ase
Odugri
Abragada
Agwe
Abo
Ndoni
Odagbi
Okabanlu
Ndoni Creek
L. Oguta
Anansi
Oguta
Abazieni
Ndigwi
Awo
Obegugu
Aba
Uri
Omo Nana
Ekeanam
Omonoha
Nkwerri
Diki Nafai
Eke Ogu
Ogoelli
Eziachi
Ikwe R.
Afonta
Ihorma
Amanputa
Umu Oma
Ebu
Ohakpu
Orio Oku
Ozara
Acha
Afor Ono Elimo
Okwodo
Eke Amibu
Afor Isu
Afor Amobu
Eke Okpoa
Orio
Omoka
Afor Osiezi
Ahazeala
Afor Attahi
Uba Nkwo Ogwa
Eke Alla Akabo
Nkwo Amohia
Eke Azara
Orodo
Oburu
Amowa
Nkwala
Ekambara
Akabo
Abuba
Orogwe
Okwa R.
Nkwo Durru
Uri Omo Eke
Omo Ngasa
Ezeama
Ugiri
Apparadim
Ohuala
Akpahia
Obaha
Omo Bina
Eke Aliki
Uria Mbama
Omoke
Omo Nachi
Afobu
Ohuma
Omo Hunta
Omoka
Ahiara
Orimiri
Ezeala
Ngwa
Eke
Obiri
Exi Udo
Udo
Omo Dieke
Obakala
Omo Ilia
Obohon
Owerri
Isara owala
Amon-amo
Oboama
Amomora
Itu
Nsidimo
Eziamu
Ihube
Ihubi
Eke Omawelu
Uria Omo Kelli
Nkwo Omolorto
Nkwo Achara
Elugu
Afor Atcha
Uturu
Okigwi
Afor Lokpa
Nkwo Ahia
Nkwo Alaman
Nkwo Ibera
Nkwo Unamini
Nkwo Ojoabo
Nkwo Oga
Afor Omo Duru
Nkwo Okwo Ohia
Afor Uku
Nkwo Omowa
Nkwo Ohwere
Afor Amona
Ikwe R.
Nkwerri
Nkwo Izieke
Eke Abaro
Afor Amese
Nkwo Ohibi
Afor Epiechi
Orio Amomma
Orio Omo Duru
Orio Okporo
Orio Omoha
Eke Amanachi
Eke Afita
Orio Azzah
Orashi R.
Nkwo Ohibi
Eke Akpo
Orio Akwa
Orio Owerri
Orio Oboabo
Orio Olpolo
Orio Alewa
Orio Udo Oga
Eke Umuchia
Uria Ahia
Afor Akaba
Uria Nkwo
Nkwo Ako
Afor Omaelu
Eke Omo Ekwe
Afor Omo Ekwe
Afor Ezeama
Afor Ezeama
Afor Ezeama

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Natural Scale 1:500,000 or 1 Inch = 7·89 Statute Miles.

Miles 10 5 0 10 20 Miles

8° 8° 30′ 6° 6° 30′

S H I

Mteżhi Ishiangō Abwezoko Mwezoka Opotom Omuda Mwehara Abakalliki Ezzago Mwezokoha Mkwago Mkt Emeyi Okohia Ako Mkt Ezza Orizo Abbia Amago Ezhi Echi Aliki Ijeggu Eja Ijulem Lead Mines Wanulu Mkt Ojon Mkt Ababo Onitcha Akbaraba Aliki Aliki Opotokum Ogrude Ohinagama Ama Ezekwe Achara Idembi Oroko Eke-acharu Olua Obubra Hill Ogunango Amunkuma Ibom Aba Omoku Esheki Amarria Mkt Amago Agegba Ekeripio CROSS RIVER Ibi Amasiri Afikpo Ediba Osu Oguago Amango Nde ebba Owruta Okguru Okporikwu Ndibi (beach) Amekpu Item Mibo Mayaiyi Edaba Ungwana Abo Ameke Amogudu Abiriba Thetha Iberru Abawje Enemma Ozultum Ozultum R. Idere R. Egu Ndibe Ameke Abam Bende From Aro Chuku, Itu & Calabar

Yahe R. Yahe Baobuthu Enhum Banbara Moya Cr. Jebiatam Aditem Ogomogon Nkudu Njigpeji Njinaya

Northern Boundary of Southern Nigeria.

Scale 1:3,000,000 or 1 Inch = 47·34 Statute Miles.

10 0 10 20 30 40 50 Miles

MUNSHI SOUTHERN IHNI ABAKALIKI OGUTA OWERRI BENDE NIGERIA Ogugru R. Anambra R. Niger R. Nun R. Tshadda Asaba Onitsha Awka Abakalliki Obubra Hill Afikpo Cross R. Bullock Islands Oguta Omo Alum Oban Hills Aro Chuku Itu CALABAR R. Aboi R. Brass R. Bonny R. Opobo R. Kwa Ibo R. Calabar RIO DEL REY

38°
39°
BRITISH EA
Sketch of th
betwe
KITUI AND THE
by
CAPT. L. AYLMER
Scale 1:1.000.000 or 1
10 5 0 10
Route shown
Mutito Hills
R. Mui
R. Thua
Kiseini
Sombi
Magongo
R. Tiva
Kitui
Mutuluni Hills
Ikangi
Vor
R. Thua
Mudtha
W a k a m b a
2°
Ikutha
G a g i n d u
Water hole
Kibwezi
To Nairobi
R. Athi
R. Tiva
Water holes
Thick forest
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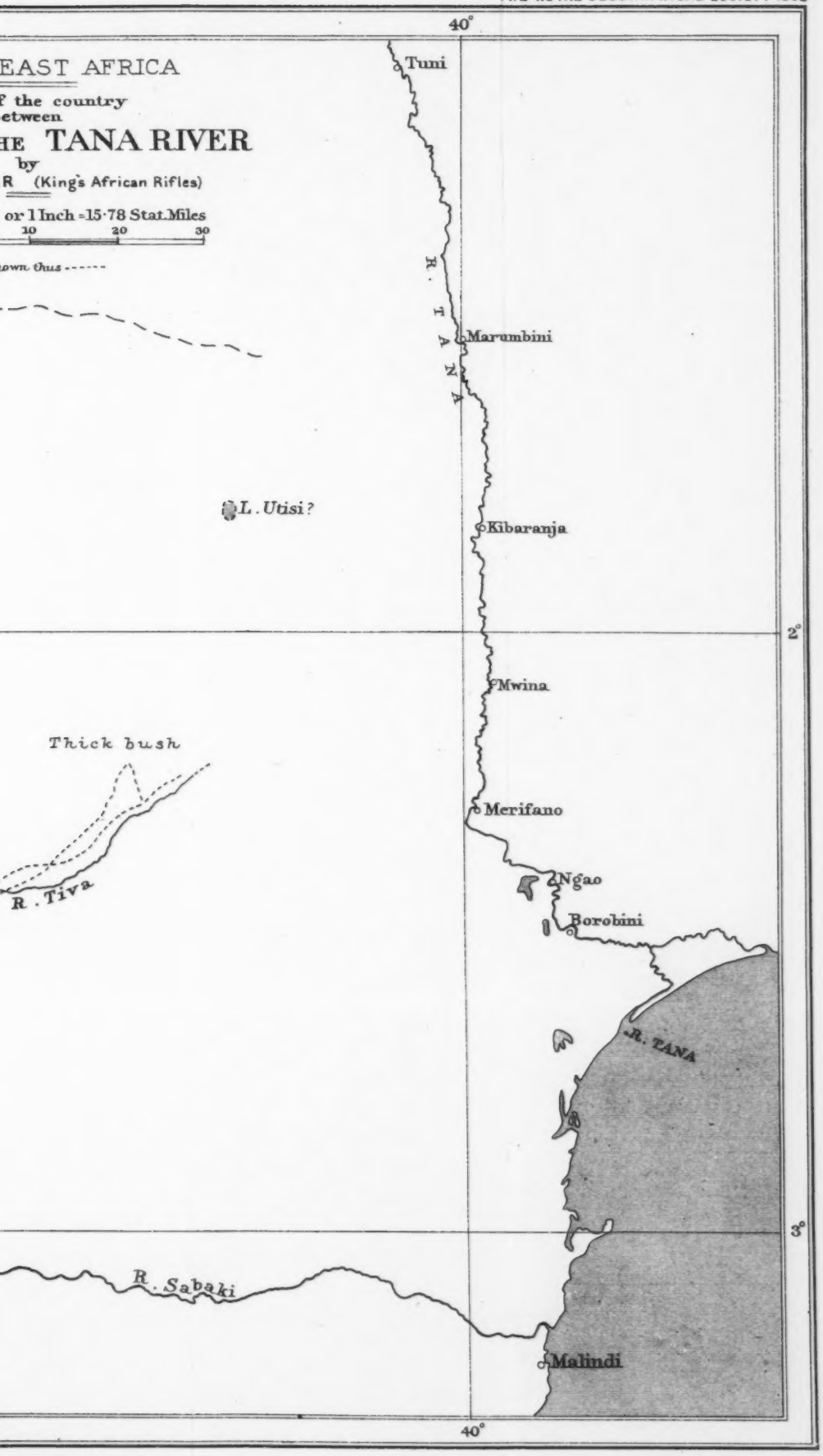

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